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A

FEW FACTS

CONCERNING

ELEMENTARY LOCOMOTION.

By FRANCIS MACERONE.

Second Edition.

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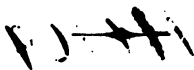
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A FEW FACTS,

&c. &c.



ONLY a few years ago many scientific papers appeared in the public journals of England, and indeed of Europe, demonstrating, with *mathematical precision*, that it was “impossible” for a Steam Carriage to propel itself along “a horizontal line, on a common road.” These mistaken views, backed by a “mathematical” (pretended) authority, have had considerable effect on the public mind; for many more persons have read such assertions, than have had an opportunity of witnessing the *demonstration* of their fallacy.

The opinion that a Steam Carriage could not propel itself up hill, on common roads, was the more naturally entertained, in consequence of the commonly observed extreme distress of horses in such situations; and, from the known fact, that Locomotive Engines, on Rail Roads, are unable to propel themselves up an inclined plane of very trifling ascent.

Without advertg to the *facts*, which have lately shown that Locomotive Carriages *can*, and *do*, propel themselves

up hill, with as much facility and speed as horse coaches it will be well to show, which can be done in a very few words, the *reason* why Steam Coaches, on *common roads*, can go up the steepest hills, and why those on rail roads cannot surmount the most (comparatively) slight inclines.

1st. The amount of extra power required to draw, or propel, a certain weight up hill, is in the ratio of the inclination; and is the same, whether it refer to a rail road, or a common road; whether it be carried on a horse's back, or dragged on wheels, or on a sledge. It is an effect occasioned simply by what is called "gravitation."

2nd. It has been satisfactorily proved, that the force necessary to propel, or draw, a ton weight, on a level rail road, is about 8 lbs.—that is $\frac{1}{256}$ lbs.—but we will say $\frac{1}{24}$ of a ton—the weight propelled. The *average* force required to draw a ton weight on a common road is one-twelfth of the whole weight, that is, 186 lbs., in lieu of 8 lbs. The former force required, therefore, is, to the latter, as one to twenty in favour of the rail way.

3rd. To go up a hill, rising one foot in twelve, *i. e.* three inches in a yard (which is about the steepest at present existing on our public roads), an additional force of traction is required, in all cases, whether on a rail road, or on a common road, equal to one-twelfth of the weight propelled. Thus, then, to go up a common road of the above elevation (one in twelve) the power of traction required is simply doubled, and no more; while on a rail road, which only require 8 lbs. on the level, one-twelfth of the ton more will be required, that is, 186 lbs. instead of 8 lbs.; which is twenty-one times greater, instead of only twice — $\frac{1}{12} + \frac{1}{24} = \frac{1}{8}$

It is this enormous difference in the tractive force necessary to propel a given weight up an inclined plane, *on a rail road*, which is so sensibly felt on the slightest elevation and which renders the ascent of the heavy engines impossib

upon one of comparative moderate rise, especially with any load behind them. This is the principal circumstance which has deceived the "scientific" men, who write reviews, and treatises in their cabinets, when they have carried their speculations into the subject of Steam Carriages on common roads.

It is evident, from the above facts (setting actual experience aside), that if a Steam Carriage have only *double* the power wanted on a level common road, it can ascend any hill that we have. If it have treble the power, it can ascend such a hill, and have one third power to spare, and so on. But to ascend the same degree of elevation on a rail road, the engine must exert a power *no less than twenty-one times* greater than it requires on the level; and to have one-third power to spare for contingencies, it must have more than thirty times the force above that required to propel it on the level!

The same reasoning applies to a horse; for the increase of power necessary to take *himself* up the above elevation, of one in twelve, is one-twelfth of his weight; and had he not the vital principle of giving out greater additional power at will, or through the stimulus of the whip, for a short period, he would be often in a situation very similar to that of a locomotive engine, on a rising rail way. This increase of power wanted to propel the horse up hill, or at rapid rates on the level, is obtained at the expense of his strength and vital principle; and occasions the distress, and speedy ruin, that we see occur to those useful animals which are so employed, or rather abused. It is evident, therefore, that the cutting down of ordinary hills, is actually of less importance to facilitate the going of Locomotive Carriages on common roads, than it is to diminish the vast expenditure in horse-flesh! It is to Mr. GOLDSWORTHY GURNEY that we are indebted for the foregoing demonstrations, and the reasoning thereon.

During the last eight years, many experiments have been made with Steam Carriages on common roads. Amongst the several patents for such carriages, several were either never constructed, or, when constructed, could not even be made to move. The following have been tried, although the greater part of them have been withdrawn from the field, or have expired a natural death; the causes and particulars of which result it would be too long to detail in this brief sketch. Mr. JULIUS GRIFFITH, patent 1821 = SAMUEL BROWN, 1823; Messrs. ANDERSON and JAMES = 1823; W. H. JAMES, 1824; Mr. D. GORDON, in the same year; in 1826, Mr. G. GURNEY, Messrs. BURSTALL and HILL, Mr. W. HANCOCK, took out patents for their respective boilers and carriages; Messrs. HEATON, of Birmingham, in the same year; in 1829, COLONEL VINEY's patent was sealed; and in 1830, Messrs. SUMMERS and OGLE patented a boiler, on the principle of that of COLONEL VINEY*. In like manner, Mr. GURNEY's boiler was nothing more than a modification of that of Messrs. ANDERSON and JAMES. Sir CHARLES DANCE has recently taken out a patent for a tubular boiler, which is said to be an improvement on GURNEY's, or rather JAMES's. Besides all the above patents, many others have been obtained for carriages, that have not been able to move at all; such as those of Mr. BOAZE, Messrs. GIBBS, Mr. JOYCE, Dr. HARLAND, Mr. HOLLAND, Dr. CHURCH, of Birmingham, Mr. FRASER, Mr. RICH, M. GAY CAZALAT, a French Chemist; and several others.

Mr. GURNEY made many short, and one long journey; but he scarcely ever went out without some derangement or other occurring, either to his machinery or to his boiler, or to both, so as to be brought to a stand still, and often to require

* See the two specifications in NEWTON's *London Journal of Arts and Sciences* for November 1, 1831, and March 1, 1832.

the aid of horses to take the carriage home. Mr. HANCOCK, Messrs. HEATON, and Mr. OGLE, have frequently exhibited their carriages, with various degrees of success; the latter employed ten weeks to journey from Southampton to Liverpool.

In January 1831, Sir CHARLES DANCE purchased three Steam Carriages of Mr. GURNEY, all constructed and painted so as to appear similar the one to the other. With these three carriages Sir C. DANCE commenced running for hire on the 21st February, 1831, between Cheltenham and Gloucester, a distance of nine miles, of beautiful and perfectly level road, for the most part on the border of a canal. The Carriage frequently accomplished the journey of nine miles within the hour; but such was the frequency of derangements, especially the bursting of one or more of the tubes of the tubular boiler, that it required the utmost exertions of an engineer (Mr. STONE), at a salary of £.1 per day, and four men, at £.3 per week, to keep one of the three coaches in moving order. These Carriages, however, certainly did not run; and, considering their tubular boiler and machinery both complicated and imperfect, they ran so as most satisfactorily to resolve the problem of Steam Carriages travelling on common roads. It is true, there were no hills between Cheltenham and Gloucester; but Mr. GURNEY had previously ascended with one of his Carriages some of the steepest hills in the neighbourhood of London, than which there are few on the ordinary turnpike roads in England.

It is easily be supposed, that, from the great expenses in this experiment, with an engineer and so many constantly in repairs, it could not have been possible to overcome the difficulties of the performance. Sir CHARLES DANCE, the many proprietors, together with the narrow-mindedness and magistrates of the district, had their interests threatened by the

substitution of Steam for horse power, formed together one of the most disgraceful and mean conspiracies against a national undertaking that can be well remembered. By means of parliamentary intrigue, and false representations, these despicable persons obtained certain local turnpike bills to pass the "Honourable House," establishing tolls on Steam Carriages, which amounted to a virtual prohibition of their use. For instance, Two Pounds were charged to a Steam Carriage, while only Two Shillings were exacted from a four-horse stage coach! In addition to this flagrant outrage against justice and utility, the worthy squires and magistrates of the Cheltenham district, suddenly, without any necessity, covered a long tract of the road with a layer of loose gravel, a foot deep, which, adding to the above-mentioned difficulties and impediments, put an entire stop to the undertaking.

Since the above period, it appears that Mr. GURNEY has abandoned all further concern in the construction of Steam Carriages, and has retired into Cornwall, his native district. His name, however, will endure in the view of posterity as that of the principal and most persevering promoter of the now general conviction, that Steam power can be most advantageously substituted for horse power, on common roads.

Sir CHARLES DANCE, however, has not lost courage. He has constructed a new Steam Coach, or rather Drag, with his *improved* tubular boiler, but which I fear will tire out his patience at last.

The performances above briefly alluded to, together with the opposition of the Cheltenham magistrates, gave rise to the Parliamentary inquiry, which was instituted on the petition of Mr. GURNEY, and of which the report was delivered on the 12th of October, 1831. This report is accompanied by the evidence of numerous engineers, and other scientific persons, the whole of which would constitute a volume of itself. It has been here attempted to give an

abstract, which will contain all the principal features of the case, and the proceeding. To lay bare the evasions, reservations, and exaggerations which those acquainted with the subject must have been astonished to find in evidence so solemnly delivered, is not to my present purpose, although fully in my power. *Past* facts, and no facts, in this matter, are now of no general interest. People will now have “the proof of the pudding.”

“Extracts from the Report of the Select Committee of the House of Commons on Steam Carriages.”

“THE REPORT.

“The Select Committee appointed to inquire into, and to report upon, the proportion of Tolls which ought to be imposed upon coaches or other vehicles propelled by Steam or Gas upon turnpike-roads; and also, to inquire into, and to report upon, the rate of Toll actually levied upon such coaches or other vehicles under any Acts of Parliament now in force; and who were instructed to inquire generally into the present state and future prospects of land carriage by means of wheeled vehicles propelled by Steam or Gas on common roads; and to report upon the probable utility which the public may derive therefrom; and who were empowered to report the Minutes of the Evidence taken before them, to the House—have examined the matters referred to them, and agreed to the following Report:—

“The Committee proceeded, in the first instance, to inquire how far the science of propelling Carriages on common roads, by means of Steam or mechanical power, had been carried into actual operation; and whether the result of the experiments

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quantity to market, and will therefore increase the nett surplus, which nett surplus constitutes the encouragement to agriculture. For example, if it requires the expenditure of two hundred quarters of corn to raise four hundred, and the expenditure of one hundred more on carriage, to bring the four hundred to market, then the nett surplus will be one hundred.

“ ‘ If, by the substitution of Steam Carriages, you can bring the same quantity to market, with an expenditure of fifty quarters, then your nett surplus is increased from one hundred to one hundred and fifty quarters ; and consequently, either the farmer’s profit or the landlord’s rent increased in a corresponding proportion. There are many tracts of land which cannot now be cultivated, because the quantity of produce expended in cultivation and in carriage exceeds the quantity which that expenditure would bring to market. But if you diminish the quantity expended in bringing a given quantity to market, then you may obtain a nett surplus produce from such inferior soils, and consequently allow cultivation to be extended over tracts which could not otherwise be tilled.

“ ‘ On the same principle, lowering the expense of carriage would enable you to apply additional quantities of labour and capital to all the soils already under cultivation. But it is not necessary to go into any illustrative examples to explain this, it being a well-known principle, that every improvement which allows us to cultivate land of a quality which could not previously be cultivated, also enables us to cultivate in a higher manner, lands already under tillage.

“ ‘ If Steam Carriages were very suddenly brought into use, and horses thereby displaced, I think the effect stated in the question would be produced for a time ; but practically, Steam Carriages can be introduced only very gradually, and the beneficial effects upon the profits of trade, by bringing agricultural produce more cheaply to market, will tend to increase profits, to encourage industry, and to enlarge the demand for labour ; so that by this gradual process there will probably be no period during which any land can actually be thrown out of cultivation, the increasing population requiring all the food which horses would cease to consume.

“ ‘ With respect to the demand for labour, that demand consists of the quantity of food and raw material which can be cheaply obtained ; and as, by the supposition, the displacing of horses will leave at liberty more food and more material, the demand for labour will ultimately be greatly increased instead of being diminished. It has been supposed, I know not how accurately, that there are employed on the common roads in Great Britain, one million of horses* ; and a horse, it is calculated, consumes the food of eight men. If Steam Carriages could ultimately be brought to such perfection as entirely to supersede draught horses on the common roads, there would be food and demand for eight millions of persons. But when we take further into consideration, that lowering the expense of carriage would enable us to extend cultivation over soils which cannot now be profitably tilled, and would have the further effect of enabling us to apply, with a profit, additional portions of labour and capital to the soils already under tillage, I think it not unfair to conclude, that were elementary power on the common roads completely to supersede draught horses, the population, wealth, and power of Great Britain would at least be doubled.

“ ‘ If there are soils of such a peculiar quality that oats is the only marketable product which they will yield, the persons employed in cultivating those lands would certainly be thrown out of that particular occupation ; but the extension of tillage over other lands not of this peculiar quality would create a demand for labour which would much more than absorb the persons thrown out from the culture of oats upon that land which would grow nothing else. But I doubt of there being any land which it is profitable to cultivate, which would not raise some other agricultural produce than oats, either for man or cattle, for which the increasing population would create a demand†.

* It has been asserted, by many competent writers, that there are a million and four hundred thousand such horses.

† Mangel-wurzel, beet-root, and potatoes, will produce admirable crops on such soils. The two former, excellent food for cattle ; the latter, for the human species. By the by, I have found, by frequent use, during the last year, that the leaves both of the beet-root and mangel-wurzel are equal, verior, to the best spinach.

“ ‘ Upon the case supposed, namely, that Steam Carriages should be employed in conveying passengers only, and the whole change to be effected in a sudden manner, I think that there would in the first instance be a diminished demand for agricultural produce, but the following process would take place. As the demand for agricultural produce was diminished, the price of such produce would fall, food would become cheaper, and the cheapening of food would benefit partly the labouring class and partly the capitalists, the one obtaining higher real wages, and the other higher profits; this increase in real wages and in profits, would effect a great encouragement to manufacturing industry, and would necessarily lead to an increase in the manufacturing population, and to the amount of capital employed in manufactures. The consequence would be, that, after some degree of pressure upon agriculture, the increased number of human beings would create the same demand for agricultural produce which the employment of horses formerly created.

“ ‘ So that even upon the extreme and most improbable supposition, that Steam Carriages should never be employed in conveying agricultural produce to market at a cheaper rate, still the benefit to the country would be very great, inasmuch as we should have a vastly increased industrious population, and England would become, much more extensively than she is at present, the great workshop of the world. In point of fact, superseding horses by mechanical power, would have precisely the same effect in increasing the population and wealth of England, as would be produced were we to increase the extent of the country by adding thereto a new and fertile territory, equal in extent to all the land which now breeds and feeds all the horses employed upon common roads. Such addition to the extent of fertile territory in England, suddenly effected, would, in the first instance, lower the value of agricultural produce, and be injurious to the proprietors of the whole portion of the territory, but no person would therefore contend that if we could enlarge the Island of Great Britain by additional tracts of fertile land, the public interests would be injured by such enlargement; this would be monstrously absurd. It is not less absurd to

object to the increase of food available for human beings, by substituting mechanical power for horses*.

“ ‘ On the principles that have been already stated with respect to agriculture, the cost of bringing all things to market is comprised of the cost of production, and the cost of carriage. Reducing the cost of carriage is precisely the same thing, in its effects, as reducing the immediate costs of production, consequently the conveyance of light goods by Steam power, must cheapen all such goods to the consumers. This will necessarily enable them to consume a greater quantity of such goods, and the consumption of the greater quantity will enlarge the demand for labour, call a larger manufacturing population into existence, and thereby re-act on agriculture, by increasing the demand for food.

“ ‘ This cheaper mode of internal carriage will not only lower the price of light and refined manufactures to the Home consumer, but will lower their price also to the Foreign consumer. This will increase the advantages which we at present possess in the Foreign market, and tend to increase our Foreign commerce. So that here again there will be an increased demand for manufactures, and for a manufacturing population; and here again will be another beneficial re-action upon the soil. So that the more we contemplate the various effects produced upon the industry of the country, by a cheaper mode of conveyance, the more we must be convinced that wealth and population will be increased; and that agriculture, instead of being injured, must necessarily partake in the increased prosperity of the country. In addition to what I have already stated, the saving of expense, and of time, in conveying passengers and goods, and the rapidity of communication, will produce effects, the amount of which it would be almost impossible to calculate.’

“ These inquiries have led the Committee to believe that this substitution of inanimate for animal power, in draught on common

* If all the goods now transported on wheeled carriages and canals were, as a hundred and fifty years ago, carried on the backs of pack horses, how many pack horses would be required? Surely ten times as many as would consume the entire produce of all the land in the country!

roads, is one of the most important improvements in the means of internal communication ever introduced. Its practicability they consider to have been fully established ; its general adoption will take place, more or less rapidly, in proportion as the attention of scientific men shall be drawn by public encouragement to further improvement.

"Many circumstances, however, must retard the general introduction of Steam as a substitute for horse power on roads. One very formidable obstacle will arise from those prejudices which always beset a new invention, especially one which will appear at first detrimental to the interests of so many individuals. This difficulty can only be surmounted by a long course of successful, though probably unprofitable, experiments. The great expense of the engine must retard the progress of such experiments. The projectors will, for a long period, work with caution, fearing not only the expense incurred by failure, but also that too sudden an exposure of their success would attract the attention of their rivals. It would be difficult to exemplify to the House how small, and apparently unimportant, an adaptation of the parts of the machinery, or of the mode of generating or applying the Steam, may be the cause of the most rapid success ; yet he who by a long course of experiment shall have first reached this point, may be unable to conceal the improvement, and others may reap the benefit of it.

"The Committee are convinced, that the real merits of this invention are such, that it may be safely left to contend with these and similar difficulties ; there are others, however, from which the Legislature can alone relieve it. Tolls, to an amount which would be utterly prohibitory of the introduction of Steam Carriages, have been imposed on some roads ; on others, the trustees have adopted modes of apportioning the charges, which would be found, if not absolutely prohibitory, at least to place such Carriages in a very unfair position as compared with ordinary coaches.

"Two causes may be assigned for the imposition of such excessive Tolls upon Steam Carriages. The first, a determination on the part of the trustees to obstruct, as much as possible, the

use of Steam as a propelling power; the second, and probably the more frequent, has been a misapprehension as to the weight of these Carriages, and their effects on roads. Either cause appears to the Committee a sufficient justification for their recommending to the House that legislative protection, in this respect, should be extended to Steam Carriages, with the least possible delay.

"The Committee beg leave to lay before the House the following statement of the progress which has been made in bringing into practical operation this mode of applying Steam in place of horse-power. The result of the experiments has been so favourable, that the Committee entertain a very sanguine expectation of its ultimate success.

"The first extensive trial of Steam as an agent in draught on common roads, was that by Mr. GURNEY, in 1829, who travelled from London to Bath, and back, in his Steam Carriage*. He states that, although a part of the machinery which brings both the propelling-wheels into action, when the full power of the engine was required, was broken at the onset, yet that on his return he performed the last eighty-four miles, from Melksham to Cranford Bridge, in ten hours, including stoppages. Mr. GURNEY has given to the Committee very full details of the form and power of his engine, which will be found in his evidence.

"The Committee have also examined Messrs. SUMMERS and OGLE, Mr. HANCOCK, and Mr. STONE, whose Steam Carriages have been in daily use, for some months past, on common roads†. It is very satisfactory to find, that although the boilers of several engines described vary most materially in form, yet that each has been found fully to answer the expectation of its inventor. So well, in fact, have their experiments succeeded, that, in each case where the proprietors have ceased to use them, it has only been for the purpose of constructing more perfect Carriages, in order to engage more extensively in the business.

"When we consider that these trials have been made under the most unfavourable circumstances—at great expense—in total

* In six days.

† And almost every day disabled.

uncertainty—without any of those guides which experience has given to other branches of engineering; that those engaged in making them are persons looking solely to their own interests, and not theorists, attempting the perfection of ingenious models: when we find them convinced, after long experience, that they are now introducing such a mode of conveyance as shall tempt the public, by its superior advantages, from the use of the admirable lines of coaches which have been generally established, it surely cannot be contended that the introduction of Steam Carriages on common roads is merely an uncertain experiment, unworthy of legislative attention?

“ Besides the Carriages already described, Mr. GURNEY has been informed, that from ‘ twenty to forty others are being built by different persons, all of which have been occasioned by his decided journey in 1829 *.’

“ The Committee have great pleasure in calling the attention of the House to the evidence of Mr. FAREW. His opinions are the more valuable, from his uniting, in so great a degree, scientific knowledge to a practical acquaintance with the subject under consideration. He states, that he has ‘ no doubt whatever but that a steady perseverance in such trials will lead to the general adoption of Steam Carriages;’ and again, ‘ that what has been done proves, to his satisfaction, the practicability of propelling stage coaches (by Steam) on good common roads, in tolerably level parts of the country, without horses, at a speed of eight or ten miles per hour.’

“ Much, of course, must remain to be done in improving their efficiency; yet Mr. GURNEY states, that he has kept up steadily the rate of 12 miles per hour: that ‘ the extreme rate at which he has run is between 20 and 30 miles per hour †.’

“ Mr. HANCOCK *reckons*, ‘ that with his Carriage he *could* keep up a speed of 10 miles per hour, without injury to the machine ‡.’

* This is over the mark. There may have been fifteen, but they have all, but two or three of them, fallen still-born.

† Down hill, if true.

‡ When *did* he ever do so except *down hill*? What regular newspaper reporters has he ever taken with him to vouch for his doings? I have often-times witnessed his performances, and have seen enough to cry “ Fudge” to such stories. The *down hill* pace is the explanation of the rate spoken of above!

" Mr. OGLE states ' that his experimental carriage went from London to Southampton, in some places, at a velocity of from 32 to 35 miles per hour *.' "

* He took five or six days to perform the seventy-five miles. Last summer he was ten weeks going from Southampton to Liverpool, and sixteen days from Liverpool to London! Mr. BERRY, of Chancery Lane, Editor of *The Register of Arts*, accompanied Mr. OGLE's Carriage from Birmingham to Wolverhampton, a distance of 18 miles, which took 6½ hours to perform! Thirty miles an hour!! I have in my possession the newspapers which announced his departure from Southampton, and his arrival at different towns on his route to Liverpool; his arrival there, his departure from thence, and his arrival in London; but at this moment I cannot lay my hand upon them. I know many gentlemen who have travelled in his carriage, and I have travelled after it myself. To those who take an interest in elementary locomotion, and who must feel quite astounded and bewildered at the 35 miles an hour story, it may be interesting and instructive to peruse a letter written by a respectable and unprejudiced machinist residing at Hurley near Marlow, Bucks, to his son, in London, which I have now before me.

" Hurley, Dec. 4th, 1832.

" DEAR ALFRED,

" We were apprized, at mid-day yesterday, that a Steam Coach was on its way to pass by our house. Of course we were all on the look out. For my part, I thought it the greatest treat I could have. When lo! about half-past two o'clock, a great unwieldy monster arrived, in a most terribly crippled state, and stopped at our shop to be repaired. They brought their own mechanics with them, so that I had no trouble with it. When done, they made a very bungling set out—stopping every twenty yards. I never was so disappointed in my life. They had on board, the master, who sat in front as steersman, and four engineers. They entirely emptied our well in filling their boiler; and we had forty men in the shop to witness the proceeding. They commenced their journey from Southampton to Liverpool, and from thence to Birmingham, and so to London. The master's name was OGLE; they say a captain in the navy, a fine young man, but * * * * He set out on an experimental expedition, and would cost him, at least, £500. I am sure the situation of master and men was by no means enviable, and I really pitied them. If this be a specimen of Steam Coaches, I have quite done with them. They only came from Dorchester, and, I believe, reached Salt-hill, about 28 miles, from morning to dark night! which I should have thought ought to have been done in two hours, at furthest. I have nothing more to write, except with kind love, &c. &c.

J. GODFREY.

" 'That they have ascended a hill, rising 1 in 6, at $16\frac{1}{2}$ miles per hour, and 4 miles of the London road, at the rate of $24\frac{1}{2}$ miles per hour, loaded with people.

" 'That his engine is capable of carrying 3 tons weight, in addition to its own.'

" Mr. SUMMERS adds, 'that they have travelled in the Carriage at the rate of 15 miles per hour, with 19 persons on the Carriage, up a hill 1 in 12.

" 'That he has continued for $4\frac{1}{2}$ miles to travel at the rate of 30 miles per hour *.

" 'That he has found no difficulty in travelling over the worst and most hilly roads †.'

" Mr. JAMES STONE states, that '36 persons have been carried on one Steam Carriage ‡.

" 'That the engine drew 5 times its own weight nearly, at the rate of from 5 to 6 miles per hour, partly up an inclination.'

" The several witnesses have estimated the probable saving of expense to the public, from the substitution of Steam power for that of horses, at from one-half to two-thirds. Mr. FAREY gives, as his opinion, 'that Steam Coaches will, very soon after their first establishment, be run for one-third of the cost of the present stage coaches.'

" Perhaps one of the principal advantages resulting from the use of Steam will be, that it may be employed as cheaply at a quick as at a slow rate; 'this is one of the advantages over horse labour, which becomes more and more expensive, as the speed is increased. There is every reason to expect, that in the end the rate of travelling by Steam will be much quicker than the utmost speed of travelling by horses; in short, the safety of travellers will become the limit to speed.' In horse-draught, the opposite result takes place; 'in all cases, horses lose power of draught in a much greater proportion than they gain speed, and hence, the work they do, becomes more expensive as they go quicker.' On this, and other points referred to in the Report, the Committee

* If true, it may have been the $4\frac{1}{2}$ miles into Southampton from London, all *down hill*!

† What regular newspaper reporters, or engineers, has he to produce as vouchers for these facts?

‡ Engineer to Mr. Gurney, and subsequently to Sir C. Dance, at Cheltenham.

have great pleasure in drawing the attention of the House to the valuable evidence of Mr. DAVIES GILBERT.

"He says :—' I have made some further remarks, which would beg to deliver in also, tending to point out particularly the advantage of Steam Conveyance when the rate of travelling is great. I would beg to add, that it appears to me extremely difficult to lay down any general rule which would be applicable to all situations and all roads, inasmuch as they vary with the nature of the materials : that up to a certain weight, proportionate to the corresponding width of the wheel, it is probable that the injury to any road may be very little, but that beyond a certain weight, compared again with a corresponding breadth of the wheels, the materials would be entirely crushed, and the road totally destroyed ; therefore it follows, that even on all roads there must be a limit to the weight of Carriages, as it is quite impossible that a wheel of enormous breadth could bear uniformly on all its surface. For instance, where trains of artillery are drawn over roads, the excess of their weight beyond what the materials are capable of sustaining, has been found sufficient for grinding them to powder. The slow conveyance of heavy weights may perhaps be effected by Steam on well-made and nearly level roads, so as to supersede the use of horses ; but Steam power is eminently useful for producing great velocities. It was last year determined by the Society of Civil Engineers after much inquiry and discussion, that the expense of conveying Carriages drawn by horses was at its minimum when the rate of travelling equalled about three miles an hour *, and that expense increased up to the practical limit of speed, nearly as the velocity including the greater price of horses adapted to swift driving, their increased feed and attendance, the reduced length of the stages, and, with every precaution, the short period of the

* That is to say on an unpaved road ; but on a paved one, heavy waggons can be propelled with one-third of the power required on the former. At with the slow motion of three or four miles per hour, the machinery will not be at all injured by the shaking. Were paved roads constructed and maintained according to the system developed in my work called "Hints to Paviours," published by the publisher of this pamphlet, great speed might be added to facility of propulsion.

services; on the contrary, friction being a given quantity as well as the force requisite for impelling a given weight up a given ascent, the power required for moving Steam Carriages on a railway remains theoretically independent of its speed, and practically increases but a very little, in consequence of resistance from the atmosphere, slight impacts against the wheels, inertia of the reciprocating piston, &c. The expenditure of what I have termed Efficiency, is as the actual force multiplied by the velocity, and the consumption of fuel in a given time will be in the same proportion, but the time of performing a given distance being inversely as the velocity, the expenditure of fuel will theoretically be constant for a given distance, and very nearly so in practice. The power requisite for moving bodies through water is the opposite extreme; here the mechanical resistance of the fluid increases with the square of the velocity, as do the elevation of the water at the prow, and its depression at the stern. The oars or paddles must therefore preserve a constant ratio to the velocity of the vessel; and the force applied will consequently vary as the squares of the velocity; and the Expenditure of Efficiency being as the force multiplied by the velocity, the consumption of fuel will be as the cube of the velocity in a given time, or as the square of the velocity on a given space; and I have ascertained from the records of voyages performed by Steam vessels, that the law is nearly correct in practice: hence the great power required for such Steam vessels as are constructed not merely for speed, but also to set at defiance the opposition of winds and seas; while, on the contrary, a very small power will be found sufficient for moving ships of the largest dimensions through the water at the rate of two or three miles an hour, when their sails are rendered useless by continued calms*.

“ Without increase of cost, we have obtained a power which will ensure a rapidity of internal communication far beyond the utmost speed of horses in draught†.

“ The performance of these Carriages may not hitherto have attained this point, but when once it has been established, that

* Hence the certainty, that a comparatively very small Steam power is required to propel heavy waggons at a slow rate, on a well-paved road.

† Provided you make good roads; especially such as I recommend at page 74.

with equal speed we can use steam more cheaply in draught than horse-power, every day's increased experience in the management of the engines will induce greater confidence, greater skill, and greater speed.

"The cheapness of the conveyance will probably be for some time a secondary consideration. If at present it can be used as cheaply as horse-power, the competition with the former modes of conveyance will first take place as to speed. When once the superiority of Steam Carriages shall have been fully established, competition will induce economy in the cost of working them. The evidence, however, of Mr. MACNEIL, showing the improving efficiency with diminished expenditure of fuel by locomotive engines on railways, convinces the Committee that experience will soon teach a better construction of the engines, and a less costly mode of generating the requisite supply of Steam.

"Nor are the advantages of Steam power confined to the greater velocity gained, or to its greater cheapness than horse-draught. In the latter, danger is increased, in as large a proportion as expense, by greater speed. In Steam power, on the contrary, 'there is no danger of being run away with; and that of being overturned is greatly diminished. It is difficult to controul four such horses as can draw a heavy carriage ten miles per hour, in case they are frightened, or choose to run away; and for quick travelling, they must be kept in that state of courage, that they are always inclined for running away, particularly down hills, and at sharp turns of the road. In Steam, however, there is little corresponding danger, being perfectly controulable, and capable of exerting its power in reverse in going down hills.' Every witness examined has given the fullest and most satisfactory evidence of the perfect controul which the conductor has over the movement of the Carriage. With the slightest exertion they can be stopped or turned, under circumstances where horses would be totally unmanageable.*

"The Committee have, throughout their examinations, been

* This "reversing" of the action of the engines is an injudicious application to Steam Carriages, and will cause more accidents than it will prevent. Friction on the circumference of the wheels, as applied by Mr. OGLE, is the best check, or "drag."

most anxious to ascertain whether the apprehension, very commonly entertained, that an extensive use of these Carriages on roads would be the cause of frequent accidents, and continued annoyance to the public, was well founded.

" The danger arising from the use of Steam Carriages was stated to be two-fold—that to which passengers were exposed from explosion of the boiler, and the breaking of the machinery; and the effect produced on horses, by the noise and appearance of the engine.

" Steam has been applied as a power in draught in two ways—by means of an engine placed on the same Carriage with the passengers; and by placing the engine on a separate Carriage from that in which they are conveyed. In either case, the probability of danger from explosion has been rendered infinitely small, from the judicious construction of boiler which has been adopted.

" These boilers expose a very considerable surface to the fire, and Steam is generated with the greatest rapidity. From their peculiar form, the requisite supply of Steam depends on its continued and rapid formation; no large and dangerous quantity can at any time be collected. *Should the safety valve be stopped, and the supply of Steam be kept up in greater abundance than the engines require, the explosion may take place, but the danger would be comparatively trifling, from the small quantity of Steam which could act on any portion of the boilers.* As an engine, invented by Mr. TREVITHICK*, has not been, as yet, applied to Carriages, the Committee can do no more than draw the attention of the House to the ingenuity of its contrivance. Should it, in practice, be found to answer his expectations, it will remove entirely all danger from explosion. In each of the Carriages described to the Committee, the boilers have been proved to a considerably greater pressure than they can ever have to sustain.

" Mr. FAREY considers that, ' the danger of explosion is less

* Instead of "engine," boiler should have been the word; but any how, this "invention" of Mr. TREVITHICK's is nothing more or less than an exact copy of COLONEL VINEY's patent, of one tube or cylinder within another, since patented again by Mr. OGLE, which has never been applied by the Colonel to any thing in the way of elementary power.—See NEWTON'S *Journal of Arts and Sciences* for November 1831, and March 1832.

than the danger attendant on the use of horses in draught ; that the danger in these boilers is less than those employed on the railway* ; although even there, the instances of explosion have been very rare.' The danger arising to passengers from the breaking of the machinery need scarcely be taken into consideration. It is a mere question of delay, and can scarcely exceed in frequency the casualties which may occur with horses.

" It has been frequently urged against these Carriages, that wherever they shall be introduced, they must effectually prevent all other travelling on the road ; as no horse will bear quietly the noise and smoke of the engine.

" The Committee believe that these statements are unfounded. Whatever noise may be complained of, arises from the present defective construction of the machinery, and will be corrected as the makers of such Carriages gain greater experience. Admitting even, that the present engines do work with some noise, the effect on horses has been greatly exaggerated. All the witnesses accustomed to travel in these Carriages, even on the crowded roads adjacent to the metropolis, have stated that horses are very seldom frightened in passing. Mr. FAREY and Mr. MACNEIL have given even more favourable evidence in this respect of the little annoyance.

" No smoke need arise from such engines. Coke is usually burned in Locomotive Engines, on railways, to obviate this annoyance, and those Steam Carriages which have hitherto been established also burn it. Their liability to be indicted as nuisances will sufficiently check their using any offensive fuel.

" There is no reason to fear that waste steam will cause much annoyance. In Mr. HANCOCK's engine it passes into the fire ; and in other Locomotive Engines it is used in aid of the power, by creating a quicker draught and more rapid combustion of the fuel. In Mr. TREVITHICK's engine it will be returned into the boiler.

" The Committee not having received evidence that Gas has been practically employed in propelling Carriages on common roads, have not considered it expedient to inquire as to the

* The boilers of all the railway engines are more or less dangerous in use, although none of them can work at a pressure of more than 50 or to the square inch.

progress made by several scientific persons who are engaged in making experiments on gases, with the view of procuring a still cheaper and more efficient power than Steam.

“ The Committee having satisfied themselves that Steam has been successfully adopted as a substitute for horse-power on roads, proceeded to examine whether Tolls have been imposed on Carriages, thus propelled, so excessive as to require legislative interference, and also to consider the rate of Tolls by which Steam Carriages should be brought to contribute, in a fair proportion with other carriages, to the maintenance of the roads on which they may be used.

“ They have annexed a list of those local Acts in which Tolls have been placed on Steam, or mechanically-propelled Carriages.

“ Mr. GURNEY has given the following specimens of the oppressive rate of Tolls adopted in several of these Acts :—On the Liverpool and Prescot Road, Mr. GURNEY’s Carriage would be charged £.2 8s., while a loaded stage-coach would only pay 4s. On the Bathgate Road, the same Carriage would be charged £.1 7s. 1d., while a coach drawn by four horses would pay 5s. On the Ashburnham and Totness Road, Mr. Gurney would have to pay £.2, while a coach drawn by four horses would be charged only 3s. On the Teignmouth and Dawlish Roads, this proportion is 12s. to 2s.

“ Such exorbitant Tolls on Steam Carriages can only be justified on the following grounds :—

“ *First*, because the number of passengers conveyed on, or by, a Steam Carriage, will be so great as to diminish (at least to the extent of the difference of the rate of Toll) the total number of Carriages used on the road ; or, *secondly*, because Steam Carriages induce additional expense in the repairs of the roads.

“ The Committee see no reason to suppose that, for the present, the substitution of Steam Carriages, conveying a greater number of persons than common coaches, will take place to any very material extent ; and as to the second, of increased charge, the trustees, in framing their Tolls, have probably not minutely calculated the Amount of injury to roads likely to arise from them.

“ The Committee are of opinion that the only ground on

which a fair claim of Toll can be made on any public road, is raise a fund, which, with the strictest economy, shall be just sufficient—first, to repay the expense of its original formation, and, secondly, to maintain it in good and sufficient repair.

" In conclusion, the Committee submit the following Summary of the Evidence, given by the several witnesses, as to the progress made in the application of Steam to the purposes of draught on common roads.

" Sufficient evidence has been adduced to convince your Committee :—

- " 1. That Carriages can be propelled by Steam on common roads at an average rate of ten miles per hour.
- " 2. That at this rate they have conveyed upwards of fourteen passengers.
- " 3. That their weight, including Engine, fuel, water, and attendants, may be under three tons.
- " 4. That they can ascend and descend hills of considerable inclination with facility and safety.
- " 5. That they are perfectly safe for passengers.
- " 6. That they are not (or need not be, if properly constructed) nuisances to the Public.
- " 7. That they will become a speedier and cheaper mode of conveyance than Carriages drawn by horses.
- " 8. That, as they admit of greater breadth of tire than other Carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draught, such Carriages will cause less wear of roads than coaches drawn by horses.
- " 9. That rates of Toll have been imposed on Steam Carriages, which would prohibit their being used on several lines of road were such charges permitted to remain unaltered."

We see by the above evidence and report, notwithstanding the comparatively very imperfect performances of the Steam Carriages which formed the subject of the investigation, that men the most competent to judge are fully convinced

of the advantages which must result from the substitution of Steam for horse power on common roads. *Subsequently*, however, to the issuing of the above report, a Steam Carriage has been built by Mr. JOHN SQUIRE and myself, far superior to any that have preceded it. The boiler is of such a construction as to render *injurious* accidents impossible; and the machinery is of so compact and simple a nature, that the carriage has actually run 1,700 miles without any repairs having been required either to the machinery or boiler. In returning from Windsor to London, on the 7th of last September, the axle-tree of this coach broke, when within three miles of home. A gentleman connected with the *Morning Chronicle**, who was one of the party, gave the following report in that paper:—

Morning Chronicle, Sept. 9, 1833.

“STEAM TRIP TO WINDSOR.

“Yesterday morning, at ten minutes before eleven, a Steam Carriage, constructed by Colonel MACERONE and Mr. SQUIRE, started from the wharf, No. 19, at Paddington, with a view of running to Windsor and back. The carriage contained, including Colonel MACERONE, Mr. SQUIRE who guided it, and two working engineers, one to look after the fire behind, and one riding on the box before, eleven persons, and might weigh about $3\frac{1}{2}$ tons. The place of starting is about one mile from Hyde Park Corner, making the distance to Windsor twenty-four miles. The carriage has, we understand, been running about in the neighbourhood of Paddington for some time; and therefore, on leaving the yard, excited no great attention. As it went down the Edgware Road, and as it got into the great high road, the people became more interested in the novelty, and numbers stopped, or ran to the windows, to see a carriage running without horses. It was accompanied on horseback by Mr. OGLE, a gentleman well known as having invented a steam-boiler, which he has applied to locomotive carriages with considerable success. He kept up with the Steam Carriage about twenty minutes, when, being

* Mr. Hodgkins, now editor of *The Courier*.

satisfied, by what he saw, that this was likely to be a successful experiment, and finding that it would breathe his horse to gallop on, he gave up, and left it to pursue its way unattended. The carriage stopped at Turnham Green to take in water, which, as there was no contrivance for accelerating the operation, took up six minutes. It again stopped, about six miles farther on, for the same purpose, and was delayed seven minutes. On reaching a place called Middle Bridge, about a mile on the London side of Colnbrook, the road, precisely on the rise of the bridge, had recently been covered four inches deep with loose stones, and the steam not being at that moment very strong, owing to a little negligence on the part of the stoker, the carriage stopped*. The steam was, in fact, not sufficiently powerful to make the carriage overcome the obstacle, and it was not without the assistance of the gentlemen in it that it was got over the bridge. We believe that the very bad state of the road at that point, and the negligence alluded to, accounted for the delay; for at every other hill in its progress it ascended without difficulty. The delay here was seventeen minutes. Again, before reaching Windsor, the carriage was stopped, to take in more water, and get the fire in good order, which caused a considerable delay. There were one or two other trifling stoppages afterwards on the road, and including them all, the carriage reached the New Inn at Windsor in two hours and fifty-six minutes. Including stoppages, it went at a rate of more than eight miles an hour. Excluding stoppages, it travelled at the average rate of twelve miles an hour. The time was carefully marked between the mile stones; and it was found that the speed was at the rate of ten, twelve, thirteen, eleven, and fourteen miles per hour.

"After remaining at Windsor for an hour and 46 minutes, where the Carriage attracted great attention, it was again started for London, and set off in grand style. Several gentlemen on horseback accompanied it, and expressed their admiration at its

* It did not stop of itself, but was erroneously stopped, and could not immediately be started again with only one wheel "clutched," on the steep pitch in a thick bed of loose shingles, as the wheels spun round without holding. On our return we took a run at it, and passed it at seven miles the hour.

velocity. It was soon found, however, that proper precautions had not been used at Windsor to keep up the fire, and clear out the fire-place, and before reaching the first halting place the fire got low, and the steam diminished much in power. Nevertheless, the Carriage ran on at the rate of seven, eight, and nine miles per hour; and, notwithstanding sundry stoppages to take in water, as well as on account of little accidents, chiefly owing to a want of care on the part of the workmen, it reached Hammersmith, on its way back to London, about half-past six, when the hind axle-tree broke, and its farther progress was suddenly arrested. The steam, which, at the last halting place, had been well got up, was immediately let off, and the rush startled and alarmed the people in the neighbourhood, who were unacquainted with its effects. This was indeed rather a striking scene, for care was taken the instant the Carriage stopped to rake the fire out in the road, which, with the crowd, and the escaping steam, caused general astonishment, and perhaps a little fright. With this exception, we are bound to say, that no Carriage could be less alarming, or more safe. Even the breaking of the axle-tree caused no concussion, and the passengers alighted without the least hurry or injury. We scarcely ever rode in an easier-going vehicle; its motion was perfect luxury, compared to the motion of a city omnibus. Except when the Carriage was at rest, and when the machinery was worked to get up the fire, which occasioned a jarring, there was no unpleasant motion, noise, or heat whatever. If to those who rode in it the Carriage was comfortable, we can only say, that it gave no annoyance to those who were in its vicinity. There was no smoke, because the fuel was coke. There was no escape of steam; and the noise did not exceed that made by a common cart when rapidly driven. Some few horses in carriages—amongst others, two in the carriage of the Duke of Argyle—and in stage coaches, and other vehicles, were a little shy, and started; but the majority of those who passed by the Steam Carriage, on the road, were unaffected by the noise. Along the whole line, both going and coming, the people ran into the streets, or to the windows, eager to get a sight of the carriage; and, on several occasions, persons waved their hats, or cheered,

as it passed. We are happy to see such a homage paid to the genius of invention, and have no doubt, now that the turmoil of political agitation is over, that our people will again find pleasure in pursuing those useful arts which have already contributed so much to the wealth and the glory of our country. We look upon this experiment, notwithstanding the sundry little disasters the Carriage met with, and notwithstanding the final break down, all of which were disasters of practical detail, not of principle—the cause of which, in repetition of the experiment, will be remedied—as setting completely at rest the doubtful question, whether Steam Carriages can be advantageously propelled on common roads. If a journey of twenty-four miles can be performed, why not a thousand such journeys; and why not journeys of thrice or ten times the number of miles? It will, of course, now turn out a question of comparative expense? and, we understand, that even imperfect as the machinery of Locomotive Carriages now is (and every day must improve it), they can be worked for thirty per cent. less than common carriages. They are, undoubtedly, as safe and as pleasant. It should recommend them to one large class of the community, that they would put an end to that cruelty with which a stage-coach horse is proverbially treated. The Carriage with which this trip was made, consisted of an open chariot placed before a steam-boiler. The merit of the invention consists, we understand, in the boiler. The engine, of course, is of the high pressure kind, and has generally been worked at the pressure of 150lbs. to the square inch; but on the trip to Windsor the pressure was not equal to that. The whole of the machinery, except the boiler and fire-place, which are behind the chariot, is placed horizontally beneath the Carriage, and between a strong frame of wood-work. The size of the whole is not greater than that of an omnibus, and the Carriage is capable of being made ornamental. In conclusion, we must say, that we look upon the employment of Steam Carriages on common roads as one of the inventions now in progress, which are calculated to effect a great change in the condition of our people, and, indeed, of all mankind."

On which report Colonel M. made the following remarks:—

"STEAM CARRIAGE.

"To the Editor of the Morning Chronicle.

"SIR,—I beg to return you my thanks for your having taken the trouble to notice our Steam trip to Windsor of last Saturday, the account of which was given with simplicity and truth. I do not now address you for the purpose of emendation, far less contradiction, but merely to give some little explanation which may be necessary for the proper understanding of those who are unacquainted with the nature of Locomotive Carriages. It is truly stated that the speed of the Carriage varied from fourteen to nine, and even, for short intervals, eight miles per hour; this was in consequence of no fuel being supplied to the fire during the progress of the Carriage from one station to the other, but being thrown in all at once the fire was thereby eadened for many minutes. The medium speed, you observe, was $12\frac{1}{2}$ miles per hour. It would be useless for me to explain ere the why and the wherefore of this mismanagement; all I will say is, that it shall not occur again.

"We stuck fast for some minutes on the bridge, in *ten* inches (not 'four') depth of shingles, not for want of power, but from having only one wheel locked to the axle; the lever to move the clutch into the other wheel was wanting. The one wheel spun round in the shingles; the both would have held. In fact, but for mismanagement, the *one* only would have held, as was evinced by our rapid return over the same bridge, which was as deeply laid with shingles on the one side as on the other, and they were actually laid during the interval of our first passing and our return. There is, by the by, one little error in your statement of the trip to Windsor, and that is wherein you say 'Steam Carriages can be worked for 30 per cent. less than common carriages.' I do not know what it may cost to work other Steam Carriages; but it is essential that you should be informed that in our journey to Windsor and back (forty-eight miles), we did not consume so much as five sacks of coke, which, at two shillings per sack, *the retail London price*, makes ten shillings, the expense of propelling a Carriage which is capable

of carrying many more passengers, besides luggage, than a four-horse stage-coach a distance of forty-eight miles. The difference in the expense then is, Steam-coach three-pence (or four-pence, if you please) per mile; four horses for common coach, how much?—three shillings, shall we say, per mile? Two men are required for a Steam-coach; two also for a horse-coach. What the cost of the repairs of a horse-coach amount to I do not know; but this I know, and can also prove, that we have run our steam-coach above 1,700 miles, without ever having had occasion for the slightest repairs whatever, either to the machinery or the boiler. As it has come home so it has gone out again, day after day, week after week; nothing but a rag and a little oil being ever applied to it. *We have never once been stopped on the road through any derangement, either of the machinery or the boiler.* You may certainly say that the breaking of the axle-tree was a dead poser—so it was, and so it has often proved to all kinds of waggons, stage carriages, gentlemen's carriages, and even to royal carriages, as the mere instances which find their way into the newspapers every week must sufficiently prove.

“The why and the wherefore of our axle-tree breaking, as well as of my assuring you it shall never break again, it is unnecessary for me to detail in this place*.

“‘Our final break down,’ as you say, was certainly a disaster; but I do not know what is meant by the other ‘sundry little disasters the carriage met with.’ This term ‘disasters’ can hardly be applied to the periodical diminution of the speed for want of fire, or even to the detention of the carriage for a few minutes on a hill of shingles. I say ‘shingles,’ because the stuff, as any one may see, is far too large to be called gravel; besides being perfectly unbroken and *smooth*. However, I dare say the word

* *Cranked axles*, of four, or four and a half inches diameter, are so difficult to make in a common forge *with sledge hammers*, that not one in five so made, by the best firemen, will prove perfectly sound. I have now had them made under a tilt hammer, weighing three hundred weight, which turns them out as sound as wax. It is only within the last month that I have learnt that there is such a thing as a tilt hammer in London, which, for the information of my readers, I announce that they may find at Howard's iron works, Rotherhithe.

'disastrous' was a mere slip of the pen, except with reference to the breaking of the axle-tree ; and after all we accomplished the distance in much less time than is employed by the horse coaches.

"What we shall do, and what our speed will be, so soon as we can put a new axle-tree to the carriage, the public will see ; meantime, I will only just mention what we have done, and that within this month past. We have repeatedly run five miles out and five miles home, either on the Harrow or the Edgware road (both hilly) in forty minutes. We have repeatedly run two miles in six minutes, and the three miles, which include the Windmill and another hill beyond Kilburn, in ten minutes. Last Monday we did one mile in two minutes and a half ; but it is unnecessary for me to *say* more at present. In a few days, *doings* will answer better to the purpose. However, I must not forget to state, that for corroboration of these facts, I can refer the sceptical, if any there be, to several highly-respectable gentlemen who rode with us on the occasions referred to ; such as Captain W. SANDON, R.N. ; Mr. HULLMANDEL and Mr. WALTON, of Great Marlborough Street ; Mr. VALANCE, the Engineer ; Mr. CORT, Mr. WARD, and many others.

"As it is not possible for me to make out so many copies of this letter as to enable me to address one to the Editors of each of the papers in which the last 'trip to Windsor' has appeared, I take the liberty of requesting the Editors of the said papers to have the goodness to insert this letter, as though I had had time to address it to each of them individually.

"I have the honor to be,

"SIR,

"Your obedient humble Servant,

"FRANCIS MACERONE."

"*Wharf, 19, Paddington Green, Sept. 9, 1833.*"

"P.S.—I have forgotten to mention, when speaking of the comparative cost of propelling Steam or horse coach (which I have above shown to be as one penny to a shilling), that the former are exempted from all tax, while the latter have to pay

three-pence or four-pence per mile, which alone, as I have shown above, is equal to the whole cost of the Steam Coach's propelling power—the fuel. Lord Althorp positively assured us, in the House of Commons, in July 1832, that he exempted Steam Carriages on common roads from all tax for the sake of encouragement, 'not that he was very sanguine as to their being speedily brought to answer.' As it is, we pay turnpikes equally to a four-horse coach, although we have no horses' feet to pound up the road, and our broad, vertical, cylindrical wheels do it more good than harm."

The comparative cost of a horse coach and of a Steam Coach may be pretty correctly estimated as follows:—

Calculation as to the relative Expenses of Horse and Steam Power for Locomotion, on 100 Miles of Common Road, per Day, for 313 working days in the year.

HORSE POWER.		STEAM POWER.	
	£. s.		£. s.
Outlay for three coaches . . .	450 0	Outlay for three Steam Carriages	2100 0
Outlay for 100 horses	3500 0	Wear and tear of ditto	100 0
Wear and tear of ditto, per ann. .	500 0	Fuel*, half a bushel per mile, at 6d. per bushel	391 5
Keep, shoeing, attendance, and harness, at £.15 per day, for 100 horses	4695 0	Duty—exempted by Act of Parliament	0 0
Duty to Government at 3d. per mile, i. e. 25s. per day for 313 days	391 5	Turnpikes, at 2d. per mile . . .	255 10
Turnpikes, at 2d. per mile . . .	255 10	Expenses of coke, water stations, attendants, &c. &c. . .	500 1
	£.9791 15		£.3346
Two coachmen and two guards, at 6s. per day, each	375 1	Two steerers, and two stokers, at 6s. per day, each	375
	£.10,166 16		£.3721
Difference per ann. in favour of Steam, in 100 miles . . .	6446 0†		

* This is at the London retail price of coke. In Birmingham, Manchester, &c. the price is less than one half; so that it would cost only 1½d. per mile.

† The Observer newspaper, in criticising this comparative statement, accused me of "misrepresentation," and many other bad things; amongst others, he said that it was unfair in me to charge wages for the coachmen and guards of horse coaches because they were paid by gratuities from the travellers. I replied; and among other points asked, if the same might not be predicated of the steerer and stoker Steam Coaches? My defence was not inserted!

One most important result of the recent and final demonstration, that Steam Carriages can be run for a continuance on common roads, will be, the doing away with the occasion, or pretence, for the construction of rail roads, which can only be effected at so enormous an outlay of capital. It is true that, in rich commercial countries, there do exist localities and circumstances in which short lines of rail road may be made to pay the interest of their original cost, and expensive maintenance. But such situations and cases are very few. There does not exist in Europe another line for a rail road, possessing the capability of paying, equal to that between Liverpool and Manchester, on which such an extraordinary and enormous mass of colonial produce is constantly going one way, and manufactured goods the other; and between which, thousands of persons have daily occasion to pass to and fro on commercial affairs. Moreover, an immense quantity of Irish hogs, sheep, and oxen, are conveyed inland by the rail road from Liverpool, besides butter, pork, poultry, &c. where they daily arrive in steam ships. The construction of rail roads, on any lines of road not offering the peculiar advantages of the one above mentioned, however they may answer the purposes of *the projectors and of the engineers, iron-masters and attorneys*, will surely never pay the *shareholders* the interest of their money. I am not prepared to assert, positively, that the proposed rail road from Birmingham to London, may not, perhaps, pay *the interest of the outlay, after a time*, especially if Birmingham was connected with Manchester by another line. But it must be evident, to any body who has paid the least attention to the subject, that such projects as a rail road between Windsor and London, Greenwich and London, Dover and London, Brighton and London, and, above all, Calais and Paris, are mere jobs and bubbles. This latter line of rail road cannot possibly cost less than two

millions of francs per league. The engineers may say less, but we shall hear a different story when the work has proceeded to a certain extent. The Liverpool rail road has cost above £40,000 a mile; hence, at this rate only, the rail road to Brighton would cost, at least, £2,000,000; that to Dover, £2,840,000; and to Southampton, £3,000,000! There are similarly delusive rail road schemes in Belgium and in Germany. Upon the latter mentioned lines of projected rail roads, there will be, at least according to the present state of things, scarcely any thing to carry but travellers, couriers, the mails, &c., which would not pay the interest of the outlay, were they twenty times more numerous than they are. It will be a very swift and pleasant mode of travelling, but the pleasantness will be all for the travellers, and I must not forget the engineers, &c. above alluded to, but none for the shareholders, save in perspective and promises.

The following Extract, expository of the rail-road delusion, is from a paper by my friend, Mr. R. CORT, inserted in the last number of the work called *The Journal of Steam Transport and Husbandry*.

“At a moment when the *mania* for Railway speculation is not unlikely to involve at least SIXTY MILLIONS of capital, should all the 3000 miles be laid down which have been contemplated by the Treasurer of the Manchester Railway, it may not be uninteresting to prove, to the satisfaction of those most prejudiced in their favour, how perfectly unable Rail Roads are to compete with Canals, Steam Carriages on common roads, or even Stage Coaches.

“That Rail Roads have a decided superiority over all other methods of conveyance yet adopted, is certainly true, but only where great weights are required to be carried very quickly, and without regard to expense.

" For example :—Locomotive engines, on the Manchester and Liverpool Railway, have drawn 90 and even 100 tons at one time, at the rate of 20 miles an hour. But as the whole weight carried in the most profitable half-year of the Manchester and Liverpool Railway, as shown in Statement No. 1, was 90,972 tons in 5392 trips, averaging about 17 tons per trip at most, as the profitable weight; it is plain, that as the engine, tender, fuel, water, and attendance may be said to average about 12 tons, the weight not profitable was more than *two thirds of the whole weight carried*. Assuming, therefore, the whole estimated burthen carried on the Railway, to be 4000 tons daily, for 312 days, or according to the original estimate 1,248,000 tons, the total weight paying NOTHING to the shareholders would be in the same ratio, at least 880,941 tons.

" Hitherto, the calculation has been made on the supposition that no carriages or waggons travelled empty. But from the statement issued by the Directors for instructions to Messrs. Rastrick and Walker, dated 12th January, 1829, the following calculation is made, showing that the total weight paying no toll daily, to carry 2970 tons of profitable weight would be as under :—

	Tons.
" Waggon and empty waggon from Liverpool to Manchester	2180
Ditto from Manchester to Liverpool	2500
Ninety-six engines and tenders, at 10 tons each	1960
	<hr/>
Total dead weight paying no toll :	6640
	<hr/>

" Thus, if 2970 tons of profitable weight cannot be carried without 6640 tons of weight paying no toll, 4000 tons of the former would burthen the Railway with 8942 tons, which, for 312 working days, would be 2,789,904 tons, paying *nothing*, for 1,248,000 tons of profitable weight; thereby showing that the Rail Road must carry nearly *twice* and a third of the whole profitable weight GRATIS, to make even a gross profit of $7\frac{1}{4}$ per

cent. per annum, according to the last half-year's income. Thus explaining why the expenditure in the waggon department was $73\frac{3}{8}$ per cent. of the income, while in the coach department it was only $44\frac{3}{8}$ per cent.—See Statement No. 2.

“ But it will be said, that the question is not about the surplus weight, or the amount of expenses generally, but whether a satisfactory return can be made for the capital. To this however it may be replied, that the gross weight not only does now, but must shortly diminish still more fearfully the dividend. For the weight paying nothing, is yearly giving birth to fresh expenses, exceeding already 14,000*l.* per annum for repairs alone; whilst it threatens, at no distant date, to stop the Railway altogether. That this is no designedly mischievous view of the case is proved by the fact, that every year has actually produced a diminished dividend, although the goods for conveyance have increased nearly cent. per cent.

“ Of this unpropitious finale to a plan, that opened with such fascinating prospects, the cause is to be traced to the mis-calculations of those, who, devoting all their mind to producing velocity of transport, overlooked every fact likely to impede the prosecution of a speculation, that could not fail to be a mine of wealth to engineers, surveyors, and solicitors, whatever it might be to the less fortunate Shareholders themselves.

“ The extent to which these mis-calculations have been carried, is such as almost to stagger belief. Some of the estimates, it is true, have stated in round numbers the probable cost; and a few have even condescended to enter a little into detail; but the majority have wisely failed to furnish any data at all; the projectors being well aware, that some *influential* names were all that were necessary to blind the avidity of capitalists, who depend more upon the integrity of ignorant Committees, than upon their own good sense.

“ That these mis-calculations have been wilfully made, far be it from us to assert. All that we are anxious to impress upon the mind of the public is, that in questions of apparently easy solution, engineers, publicly announced as the ‘most eminent,’

and surveyors of 'undoubted talents and activity,' are not only confessedly at variance with each other, but even with their own statements.

"For example:—After the Manchester line had been twice surveyed, and all the levels taken by engineers and surveyors, declared by the Directors to be of the highest character; and after more than 20,000*l.* had been paid for their labours, no sooner were they examined, in May, 1825, by a Committee of the House of Commons, who were no engineers at all, than, says Mr. Treasurer Booth, in his Treatise on the Railway (*p.* 18), 'a considerable ERROR, in the levels and sections was found to have been committed; and upon that ground, as well as upon others, the Bill was rejected for the time being, with the exception of the preamble, which was carried by a majority of one in a Committee of 73.

"A fresh estimate was then issued by the Directors, raising the capital from 400,000*l.* to 510,000*l.*; that is, from 12,000*l.* to 17,000*l.* per mile, and in order to produce the most perfect confidence in the accuracy of *this* estimate, after all the previous blunders, it was stated, That to avoid all chance of *similar* complaint in future, the Committee had engaged the professional services of the 'most eminent, engineers, aided by assistants of 'undoubted talents and activity;' whose combined efforts justified the fullest assurance, not only of the correctness of the plans and sections, but that the whole line would be arranged with that skill and conformity with the rules of mechanical science, which would equally challenge approbation, whether considered as a national undertaking of great public utility, or as a magnificent specimen of art.'

"Unhappily, however, not even the 'most eminent engineers,' nor the 'undoubted talents and activity of the Surveyors,' have been able to prevent a *fourth break down* in the professional estimate, the cost having risen from 17,000*l.* to nearly 40,733*l.* per mile.—*See* Statement No. 1.

"Before, however, we proceed more particularly to point out other errors in the calculations for the Manchester line, it may be as well to remark, that the dexterity exhibited for *mysti-*

fication, appears to be quite equal to the talent for *miscalculation*.

“ Among the fascinations in the Report of the Directors, in March 1832, the Shareholders were told that the expense of Omnibus accommodation was no longer to be paid by them, but by the public. The cost for carrying passengers in the half-year ending 31st of December, 1831, is stated to be 2s. 0½d. each, including 3½d. or about 15 per cent. for Omnibuses; yet, in the last half-year the cost for passengers, instead of being 1s. 9½d. averaged about 2s. 10½d.; thus adding to the cost more than four times the amount of the whole saving professed to be made by the Directors fifteen months previously!

“ So, with regard to the revenue, the picture was equally flattering. For the carriage of goods was estimated to produce 50,000*l.* per annum, or 5 per cent. on one million of the capital; instead of which, the half-year ending 31st of December, 1831, did not even yield 1 per cent. In two whole years, 1831 and 1832, it did not average yearly 2 per cent.; and in the last half-year, only 1½ per cent. The coal and turf was estimated to return 20,000*l.* per annum; yet, the utmost they have produced in eighteen months is less than 2300*l.*

“ Among other delusions, previous to the opening of the Railway, it was said by some of the engineers, that in proportion as the speed was increased, the expense of conveyance would be diminished, as the engines, by doubling their speed, would do, in the same time, double work. Accordingly, Messrs. Stephenson and Locke, in their original estimates, calculated the expense of an engine doing 936 trips yearly, or three trips per day, at the rate of 15 miles per hour, dragging a dead weight of about 30 tons, at 324*l.* 12s. 10d. including a sum of 54*l.* wisely laid aside each year for replacement of engine, and interest on cost, so that the estimated expense for motive power, was calculated at less than 6s. 6d. per trip.

“ The exact number of 30-mile trips made by the engines on the Liverpool Railway in the most productive half-year, ending 31st of December, 1831, was 5392, of which, 2944 were with passengers. The total profitable weight carried, including

passengers at 15 to a ton, was, as before stated, about 17 tons, instead of 30 tons; yet the expense or cost of these 5392 trips, for coke, wages, and repairs alone (allowing nothing for replacement) was 12,203*l.* 5*s.* 6*d.* or a little above 2*l.* 5*s.* 3*d.* per trip, instead of 6*s.* 6*d.* per trip; or the bare cost of an engine doing 936 trips was 2117*l.* 14*s.*, instead of 270*l.* 12*s.* 10*d.*, thus proving two eminent engineers to be out in their calculations, in this item alone, more than seven times over!

"To prove also how strangely some of our Reviewers are out in their calculations as to the capabilities of this Railway, Dr. Lardner states in his Treatise, that the Locomotives actually travel over it 25,000 or 30,000 miles without any expense whatever for new tubing; yet in the same half-year as last alluded to, the charge for repairs and attendance on the Liverpool Railway Coaches is stated to be 7,455*l.*, including 3,254*l.* for Omnibus accommodation; leaving, therefore, 4,201*l.* for repairs and attendance alone. The number of 30-mile trips being 2,944, the total number of miles was 88,320, and as 12 out of 24 engines employed may be considered actually engaged in the Coach department, it follows, that instead of these engines travelling 30,000 miles for NOTHING, they cannot travel even one quarter of the distance without an expense of 4,201*l.*

"In confirmation of this result, the Directors state in their Report, July last, that 'the expenses include the cost of two *new* engines. But a considerable saving is expected to take place by the recent application of *brass tubes* in the engines, in lieu of copper tubes, previously used, WHICH WERE ALMOST CONTINUALLY BURSTING,' so that where the Doctor got his data for the wonderful economy of the engine, the next edition of his work will perhaps explain.

"But one of the most vulnerable parts of the whole question is, the bare cost of keeping the Railway fit for use. For this expense, under the head of 'Maintenance of Road' *i. e.* a sum not only more than 14,000*l.* per annum, sufficient to pay five per cent on 280,000*l.* annually; but instead of being a mere bagatelle comparatively, as originally estimated, it actually now threatens,

at no distant date, to stop conveyance altogether upon it, till the road is re-laid throughout the whole distance.

“ The Foreign Quarterly Review, for October 1832, observes ‘ The rails are not supported uniformly by laying on the surface of the road, but rest upon stone pillars or sleepers, as they are called, placed at distances of a yard from each other ; and as the great weights pass over them with considerable velocity, these sleepers are driven deeper into the ground ; so that the Rail Road soon becomes uneven, one rail having one direction, and the next a different one. Though these defects are not easily detected by the eye, yet they are very sensible upon close inspection with instruments ; and still more so by the carriages that pass over them, as the wheels in passing over the joining of two rails, receive a severe jolt, and also a change of direction. Driven first on one side of the road, then on the other, the carriage rocks like a ship at sea ; whilst, at every swing, one wheel or the other strikes a rail with considerable violence.’

“ Another writer (Mr. Vallance), after much investigation, adds, ‘ The stone blocks, or bases, which carry the rails, are two feet square. The weight of the large locomotive engines is above ten tons, more than half of which being thrown on two of the wheels, each block has three tons weight on it, when those wheels pass over it ; consequently the pressure upon every square inch of the foundation is above four times as much as in the boilers of Bolton and Watts’ steam engines, from which result, the sinkings and drivings into the ground alluded to in the Foreign Quarterly Review*. In fact, there are in the whole, including every liability to derangement and repair, above 80,000 parts or places on every mile of the Manchester Railway where adjustment or repair may daily be required.’

“ But let us see how this same item will affect Steam Carriages on Common Roads :—*First*.—It should be remembered, that five or six years must be lost altogether, besides a very large sum

* These blocks, or bases, should be laid upon a foundation of stones well rammed into the ground by a pile driver, weighing several hundred weight, as I recommend for all pavements, and steam carriage stone-ways.

interest alone, before Rail Roads for long lines can be constructed, even for the chance of income; and then at a cost, which, as compared with turnpike roads, and the Manchester Railway, is as 40,733*l.* to 1500*l.* per mile, or more than twenty-seven times dearer than the latter. But, according to the plan of Sir Henry Parnell and Mr. Telford, the expense of a stone Railway to Birmingham will be about one-tenth of the estimated cost of the iron Railway by four engineers; whilst, on the principle recommended by Colonel Macerone, even new lines will be wholly unnecessary.

"*Secondly.*—Common Road Steam Carriages have not to wait five or six years, or a single moment for income, having 28,000 miles of road ready made for their use, besides the benefit of not being constantly burthened, as the Locomotives on the Manchester Railway are, with a drag to each wheel more than 400 times heavier in the shape of the first cost; whilst instead of paying 488*l.* per mile for repairs, or 'maintenance of road,' Steam Carriages can maintain their road by paying merely two-pence or three-pence-halfpenny per mile for every mile they travel on it, and not before they *do* travel on it; whereas, the Manchester Railway must pay annually in *interest* or toll, more than 2000*l.* per mile, besides the 488*l.* per mile for repairs, whether the road be used or not; whilst the stone railway repairs will cost not more than 30*l.* per mile.

"*Thirdly.*—It may be said, that Steam Carriages never will succeed, owing to the complexity of the machinery, and the impossibility of freeing it from the effect of jolting, and wear and tear, on the common roads. But this, like all other objections, must surrender at last to the ingenuity of man. Already has the whole construction been simplified and reduced to a very small compass. The Inventors have far excelled the Inventors of Railway Locomotives, ten to one in speed off their own road. For not one of the latter can move effectually, if at all, on a turnpike road: an assertion supported by the evidence of some of our most enlightened engineers before a Committee of the House of Commons, on the principle, that locomotive engines on the common road, must carry with them from 21 to 25

at no distant date. The new want in the Railway. Beside road is re-laid there. The railway will not bear a pressure of more

"The Foreign. The square foot. The boilers use. The rails are not. Give the carriage load in the rate of twelve of the road. but. and bear a pressure of 150 to 200 called. placed at. or more if necessary. that is nearly great weights. and the Railway Locomotives.

sleepers are. of Railway Carriages constructed on a Road soon be. safety. being all respects of great diameter, the next a. thickness and weight of metal but sure to detected by. should they happen to burst. On the other inspection. of the Steam Carriage patented in July last by that pass. one and Mr. Squire. as well as that of Lieutenant-two rails. Charles Dance, Messrs. Gurney, and Ogle, are Driven. on a principle of separation and division, thereby riage roll. next to impossible that any explosion, or rather or the. could occur: and even if it did, the effect would be ab-

"All. harmless, that any one riding on the top of the boiler adds, surely know that such an opening had been made. For feet. inconvenience that can arise, is the stoppage of the vehicle. tent. assertions have been proved over and over again, by such repeated burstings or openings of some of the boilers, over. Sir C. Dance's, close to the backs of the passengers, the. no other annoyance than *delay*. Had this not been the case, the Committee of Engineers, headed by Mr. Telford, would not, for such occurrences under their own eye, pledge themselves to

full practicability of Steam Carriages, at a speed *not attain-*le by horses. In fact, even these accidents will shortly be made almost impossible. and Steam Carriages rendered as free from delays as they are now destitute of all danger to life or limb on common roads. Yet says Investigator, p. 107, 'more fatal accidents occurred upon the 31 miles of Iron Railway between Liverpool and Manchester, in three months, than upon all the road between London and Birmingham in so many years.'

now the late Mr. Huskison, the Engineer's own brother, and by others, the names of whom it is said, there is considerable reticence in declaring.

“Colonel Macerone, late aide-de-camp to Murat, King of Naples, a well-known distinguished officer and writer, has also edited a pamphlet, published by Wilson of the Royal Exchange, on the subject of Steam Carriages for common roads, and on rendering all turnpike roads suitable to their travelling with passengers at twenty miles the hour. The Colonel describes the principle of his plan as follows :—[Here Mr. Cort gives an extract from the first edition of this pamphlet, for which see page 73.]

“ESTIMATES FOR REVENUE.

“With regard to the estimated Revenue of all the Railways now before the public, it should be observed, that the whole of the promoters are quite right in taking as a basis for their calculations the proportion which the expenses bear to the income on the Manchester line. But unfortunately for the shareholders, some have *accommodated* the ratio to a basis of a very different kind, not from dishonesty, so much as from an over desire to fascinate others with a liberal display of profits; by reducing the *actual* cost in some cases 40 and nearly 50 per cent. ; whilst they have added at least 75 per cent. generally to the revenue, more than is likely ever to be realized, after adding to the cost the whole sum *minus* for construction and otherwise.

“But we see no reason why the ratio should be thus *decreased*, on the following grounds :—

“*First*.—According to Mr. Stephenson, jun. the first five years will be the most expensive, owing to blocks sinking, and breakage of iron.

“*Secondly*.—The published reports of the Directors, do not contain the whole cost of conveyance in the waggon department, though proved to exceed 73 per cent. of the income in the last six months of 1831. For example—engagements outstanding, and ‘extraordinaries,’ the latter including probably a magnificent warehouse at Manchester, which cost more than 20,000*l.* for the reception of goods passing along the line *gratis*.

“ Thirdly.—The expenses on a Railway are not decreased in proportion as the speed is increased, as estimated originally by Messrs. Stephenson and Locke, but multiplied six and seven times over, as proved at page 40.

“ Fourthly.—The whole of the *fixed* expenses will bear most heavily in proportion as the traffic is less. For example, on the Manchester line, for only 30 miles of Railway, including 60,000*l.* per annum for interest alone, besides the daily wages of 78 agents and clerks, and 646 engine-men, guards, and labourers, total 721; whilst the expenses of the whole would be after the rate of 42,752*l.* per annum, besides other items, exceeding after the rate of more than 12,000*l.* per annum, according to the six months ending 1831. It should be observed, also, that the carrying and waggon departments alone, exclusive of the coach department, employ 36 agents and clerks, and 231 engine-men, guards, and labourers, at a cost after the rate of 14,248*l.* per annum, whilst the coach department employs only 12 clerks and 63 engine-men, guards, and labourers, at a cost after the rate of 4,888*l.* per annum; yet the waggon department, as compared with the former, ton for ton, is full *six times less profitable*.

“ Fifthly.—The number of passengers estimated for conveyance approximates more closely to the half-year ending 1831, than to any other for the whole period. The Manchester Railway carried nearly 50,000 passengers during that period, for *nothing*, including workmen and others, the weight and carriage of whom did not lessen the cost of wear and tear: besides, before any new Railway is constructed, the duty will be *doubled*, or the same as is now paid by stage coaches, unless the Government mean to benefit one class of the community at the expense of another.

“ Sixthly.—The capital will be nearer one-half than one-third more.

“ Seventhly.—The total income estimated will be one-half at least *less*, by competition with other methods of Steam transport, 100 per cent. cheaper.

“ But to prevent the possibility of *cavil* (for we know that even a *straw* will be caught at), we have reduced the actual basis for the Southampton line to 50 per cent. of the income in the

aggon department; and for the Brighton line to 40 per cent.; giving the promoters of the latter the full benefit of only $44\frac{3}{8}$ per cent. in the coach department, although the carriage on the Manchester line, to make the cost only the latter figures, was after the rate of 180,000 passengers more at least than the Brighton Railway is estimated to convey.

"We see, however, no good reason why the same guide to expenses should not lead the Railway advocates to the other side of the account; so as to settle the profits upon a scale better suited to the local circumstances of each particular line. In the case of the Liverpool and Manchester Railway, even granting that the expenses were greater than on any other line, the profits must be incontestibly greater; for as Manchester is the heart of a district, where cotton is manufactured to a prodigious extent, it is of infinite importance to get the raw material from Liverpool as cheap as they can, and to send it away as cheap as they can: and when to this is added the fact, that the whole country between the two places is a coal district, where fuel can be had for a mere song; and where too, the ground over which the road passes is of little or no value for agricultural purposes compared with all the other lines we have named; perhaps it will appear that such circumstances alone, present not only motives for making the road, but also means for continuing it, not to be found in any part of the kingdom, or in any quarter of the world, in the same distance.

"If, therefore, it can be shown, that this, the most favourable line, has not from first to last paid back to the shareholders even four per cent. interest upon all money advanced, and must at no distant date stop paying the present dividends altogether, or borrow more money to a large amount, how can other lines less favourably placed by nature and commerce, ever hope to make double, treble, and even five times greater profits! True it is, that a portion of the expenses incurred on the Manchester line will be avoided by *improved practice* in the art of constructing similar ways and works; but all that is saved one way by skill and experience, will be more than counter-balanced by the disadvantages of other lines.

“ The total amount of interest lost during the construction of the Manchester and Liverpool Railway, up to the 31st December, 1830, and not since paid back to the shareholders, is calculated to be not less than 95,000*l.*—*See* Statement No. 1. Assuming therefore, this item to be 100,000*l.*; when the concern closed on the 16th September, 1830, the additional interest to the 31st June, 1833, would make it, roundly speaking, about 113,000*l.*, and taking the whole capital expended at the same period to be 800,000*l.*, the interest thereon, for two years nine months and a half, will be 111,666*l.*, making together 225,624*l.* due to the common interest alone at 5 per cent. !

“ Yet the aggregate amount of gross profits divided among the shareholders of the whole of the above period, after discharging interest upon all money borrowed is, according to the published returns, about 179,260*l.*, being in fact, 1240*l.* less than four per cent. on the shareholdings !

“ For the total expenses, receipts, and profits, of the Manchester and Liverpool Railway will be found to be nearly equal, up to the end of the last half-year.

	Expenses.	Receipts.
	£	net £
“ From 16 September to 31 December, 1830....	£	£14
„ 1 January to 30 June, 1831	35,379	— 65
„ 1 July to 31 December	49,025	— 89
„ 1 January to 30 June, 1832	47,770	— 74
„ 1 July to 31 December, 1832	48,278	— 81
„ 1 January to 30 June, 1833	52,900	— 86
	<u>£233,352</u>	<u>£412</u>
Total Profit	179,260	—
	<u>£412,612</u>	

“ Mr. Grahame explains why this result has not been rendered quite clear on the face of the published accounts, by stating ‘ the Railway Corporation’ keep two separate accounts of expenditure, ‘ Ordinary and Extraordinary.’ The ‘ Ordinary expenditure’ is paid from the annual returns received from the Railway; and the ‘ Extraordinary’ is paid by borrowing money or by a creation or sale of shares, which is termed, ‘ add

the capital account.' The 'Ordinary Expenditure' only affects the dividend; and it is the interest of every one concerned, to make that expenditure appear as *low* as possible, and whenever the outlays are commingled or doubtful, to throw the burthen on the obnoxious shoulder. Total capital last sworn to by the Treasurer, in April 1832, was 1,020,586*l.* Borrowed 227,000*l.*

"These, however, are arguments rather respecting the principle than the details of the calculations; and it is to the last question, which has been so *mystified*, that we wish more particularly to draw the attention of shareholders, and the public in general.

"In the waggon department of the BIRMINGHAM RAILWAY, the whole weight estimated to be conveyed in one year, besides cattle, is not much more than 51,000 tons, whilst the total burthen conveyed was 213,063 tons on the Manchester line in the two half-years given in Statement No. 2.—Yet the income from the Birmingham line is estimated to be nearly three times as much in the same department, with probably two-thirds more engines to keep, and out of a traffic not one-tenth so great!

"The whole quantity carried by the fly boats on the Birmingham line is represented to be 41,860, a distance of 149 miles, averaging about $3\frac{3}{4}d.$ per ton per mile, and the Directors estimate they shall monopolize the whole. The total charge on the Railway, to pay one farthing of interest, must be $4\frac{1}{4}d.$ per ton per mile, so that mile for mile the Canal is already 12 per cent. cheaper. But as the water carriers on the Manchester line dropped 30 per cent., the moment the Railway became competitors with them, the same parties on the Birmingham line will doubtless not prove less blind to their own interest; and long before the Railway is ready, such are the improvements now making in Canals, not only may the charge be expected to be many times *less* than the Railway, but the time now lost will be very considerably *saved*. Besides, the Manchester and Liverpool Railway has only been able to obtain one-tenth of the water-line traffic at the end of three years; and granting the Birmingham Railway secured five times as much, the income, estimated

at 92,820*l.*, would be one-half—say 46,410*l.* The only chance, therefore, for the Railway in the waggon department, must be confined to goods requiring extraordinary expedition; and these comparatively are very few. For instance, glass is stated, in evidence before Parliament, to be only 1050 tons annually; which, with the exception of a small portion of other goods for Germany and the North of Europe, at particular seasons of the year, so as to avoid the ice in the Baltic, will be the only traffic principally wanting Railway expedition.

“ Mr. William Shore admits, in his evidence, that the charge by canal from Birmingham to London, for heavy goods, including iron and coal, is only one penny per ton per mile; and for the lighter articles by fly boats, not more than one penny half-penny per ton per mile; so that after allowing for *extra* expenses, canal carriage is clearly already more than one hundred per cent. cheaper on the average for such goods, mile for mile, than the *bare cost* on the Manchester line of similar carriage the last half-year, in 1831.

“ That this is no imaginary picture, is proved by the fact, that out of 1,248,000 tons originally estimated to be conveyed between Manchester and Liverpool annually, the Railway has only carried, at most, in twelve months, 120,509 tons of the regular goods (*See* Statement No. 2.), being scarcely one-tenth part of the whole traffic, notwithstanding the double attraction of ten to one in velocity, and still more in regularity. For the water line is nearly double the distance, and instead of possessing the regularity of even Canal conveyance, the traffic is, for 18 miles of the additional length, subject to the winds and tides of the Mersey. *See* Mr. Grahame's Letter to the Water Carriers on the Manchester line, who, with Messrs. Telford, Houston, and Macneill, may be considered our leading authorities for all improvements in Canal Navigation.

“ The same Company proposes to carry 41,600 oxen 80 miles at 3*d.* per ox per mile, that is 41,000*l.*; whereas one ox is now carried on the Grand Irish Canal, from Ballinasloe to Dublin, 96 English miles, at three-eighths of a farthing per mile; and as there

is no reason why some of our Canals should not carry as cheap, this branch of the revenue is likely to be performed by others for nearly 100 per cent. less.

"The next branch of the Revenue is much more reprehensible, because, if true, the credit of the Committee is absolutely at stake to undeceive the public. The Committee estimate to carry 364,000 sheep 80 miles, at one half-penny per head per mile, for 60,666*l.* 13*s.* 4*d.* But Mr. Grahame states that the Directors were aware, that a year *previously to swearing* to this branch of the Revenue in the Lords' Committee, the Directors of the Liverpool Railway had endeavoured in vain to raise a revenue, by carrying sheep along a still more favourable line, at even *one farthing per mile each*; the butchers and graziers having declared their utter inability to pay it, and, consequently, preferred *driving their sheep*. The charge was, therefore, reduced to *one-fifth of a penny per sheep per mile*, or about one-third of the proposed charge by the Birmingham Railway. Yet, even at this low rate, Mr. Booth, the Treasurer, swears, that '*very few sheep even now are carried.*'

"Mr. Grahame then asks, 'Have the Birmingham Directors seen this *proof*? Were they, or any of them, or their officers, present when it was given on *oath*? and if so, did they attempt even once to *undeceive* the Subscribers to the extent of 40,000*l.* per annum of their promised income? If they have not done this, let an official declaration be instantly made on the subject, in justice to those Shareholders who have already petitioned to have their names withdrawn from the Railway.'

"Thus have we another lamentable proof of the disregard manifested by gentlemen of high honour and respectability, when once in office, to protect their own reputation, even in statements sent forth to the world, wearing the stamp of their own names, and known to be concocted by their own clerks. It is too much to infer, that the Committee of the Birmingham Railway meant absolutely to *deceive* the public; and we are willing to believe quite the reverse. But then are we driven to assume, that this trifle of FORTY THOUSAND PER ANNUM must have slipped into the estimate inadvertently, thence into the Press, and afterwards into

the hands of the Public, unknown to the Committee themselves, only, if this be true, the Public may ask, why it was not *withdrawn* when discovered, instead of leaving it to go its round, as a kind of *catch-trap* for the avidity of capitalists, as well as the Legislature, during the progress of the Bill in Parliament?

"For if the sum over-credited for sheep and goods by *fly* boats be deducted, the profit in this department will not be one farthing per cent.—See Statement No. 2.

"In the coach department, the delusion will be seen not less striking, when compared with the Manchester line. The total number of passengers carried by Stage Coaches between Manchester and Liverpool, before the Railway opened, was about 450 daily; whilst, for 21 months on the latter, they averaged 1,200 daily; but for the last six months only 1,098 daily, or little more than double the traffic of stage coaches. The *gross* profit by horse coaches will be found to average not less than 10 per cent., and this too founded on Railway Estimates. (See Statement No. 3.) But although nearly the whole of the coaches have ceased running against a competition equal to a saving of 50 per cent. in money and time, yet what is the result at the end of three years? The total expenditure has risen from 54 to 67 per cent. of the income in eight months;—a numerous and respectable class of the community have been deprived of bread—the government of nearly half their revenue—whilst, in fact, the Railway itself did not make, in the last six months, from passengers alone, even half the profit previously made by stage coaches.

"Nor will half the profit of horse stage coaches continue much longer to be made on the Manchester Rail Road, unless the Railway coaches and machinery should last for ever; and this too, mark, without the competition of a single Steam Carriage, or the quick boats now used on the Paisley Canal, both of which will run with passengers on the same line, many times cheaper, long before another Railway is constructed.

"Yet the Committee of the Birmingham line have a much higher conception of the capabilities of their coach department. For we cannot presume to assert that they are wilfully blind to

these incontrovertible facts. Accordingly they estimate to carry about 1,494 passengers daily, or nearly three times the number conveyed by all the stage coaches now running between London and Birmingham; and above one-third more than the whole number which the Manchester and Liverpool Railway has been able to realize, on a fair average, for twelve months, at the end of three years, after the *cholera*, one of the asserted causes of diminution, had nearly subsided.

“ Besides, whilst the Birmingham Railway is to carry passengers at *half* price, the Committee profess not to make much more than the *same* profit as is now made by stage coaches, that is about 10 per cent. (*See* Statement No. 4.) And even this, they cannot obtain without monopolizing the whole coach traffic, including posting, small parcels, bookings and portorage, leaving Steam Carriages and canals quite out of the question altogether. Yet should both become competitors with Railways on the same line, the latter is not likely to pay one per cent. profit.

“ For, unless it can be proved that the passenger traffic on the Birmingham line will be greater, it is evident that the profit must be less. But it has been already shown that the profits of the most favourable line in the whole kingdom will be swallowed up eventually in the expenses, and it may be seen, in Statement No. 2, that the present profit in the Coach Department is not more than after the rate of $4\frac{1}{2}$ per cent. per annum, consequently, it must be equally evident that the same unfortunate termination will follow, only much quicker in proportion as the means of traffic are less.

“ Mr. Giles, for the SOUTHAMPTON LINE, estimates the total expenditure for the whole traffic at 111,000*l.* per annum; that is, about 10,240*l.* for the waggon department, and 100,760*l.* for the coach department; whilst, in fact, according to the *actual* cost on the Manchester line, as per Statement No. 2, the first expense for goods will be 17,272*l.*, and the latter for passengers 150,833*l.*, making in all 168,105*l.*; or 57,105*l.* more than the engineer on the Southampton line has calculated.

“ In the waggon department the total income is expected to be

the line per mile gives about 25,334 only. As the Manchester line obtained what we like all the other Railways, of one farthing. But granting the latter, the profit would not be more

boats the income is estimated to be more than the amount of similar traffic for the last year on the Manchester line (given in Statement No. 2), more than eight times greater. But a man connected with some of the promoters of the line states, in the *Herald* of the 29th November, that Parliamentary notices would have been more fully mentioned that the line was to pass under the Chertsey, Basingstoke, and Winchester. The conveyance ever travelled by that route to the line is asked, from what data the calculations for the income have been derived? or, why the annual income has been estimated at £5,692l. per annum, on the data of another Railway, when there is not the slightest analogy, merely because the line is distinguished by a similar figure of multiplication. The writer then adds, there have been six sets of Parliamentary notices since 1830, besides two sets of Solicitors and Secretaries, and for what we know, the writer himself may be one of the *officio* authorities. But, from our own knowledge of the qualifications of the present Secretary, should it be within the range of possibility to bring this Railway to London, it will be more to his talents and exertions than to any proved means of adequate income.

On the BRISTOL LINE, the calculations for income seem to be collected more with a view to present means than future profits; in the waggon department the total income is estimated to be £3,515l. exclusive of canal or sea-borne goods; and assuming the charge to be the same as on the Manchester line, for almost double the quantity, that is $4\frac{1}{2}d.$ per ton per mile, the total will be about 50,713 tons, being at least equal to all the goods

including 41,800 tons by canal, as estimated for the Birmingham line, although the former is well known to be a much less productive route.

“ But it is not pretended that even this traffic can be obtained without superseding every other interest, and bidding defiance to any velocity or economy equal to what is now so fully established on many of our canals : and notwithstanding there is one water line (besides canals), by which goods may be brought to London from Bristol, at a freight equal to about one penny and one-eighth of a penny per ton per mile on the Railway, or nearly 400 per cent. cheaper than the latter, besides the fact already proved on the Manchester line, that owners of goods, not requiring dispatch, prefer the water line in the proportion of 10 to 1. But granting all the monopoly to be realized, the profit will not be greater in the waggon department than $1\frac{1}{2}$ per cent. See Statement No. 2.

“ In the coach department, it is notorious, that there is at least one-third less travelling between London and Bristol, than between London and Birmingham ; yet the Bristol Committee assert, that they shall carry 58,705 passengers in one year more than the Birmingham line, and 176,494 more than the Manchester line, including the most productive half-year of the whole period, under the authority of a return said to be from the Stamp Office, only taking care not to produce it, as the Birmingham Committee have done. Nor are we without strong grounds for believing, that such a return never will be published, for the best of all reasons, because it never existed to such an extent.

“ But, granting the fact was proved, are common road Steam Carriages and Canals not to carry any portion of the traffic, merely because they will both condescend to do it many times cheaper, long before the Railway opens ? Is the Bristol line, like the Birmingham line, to monopolize all the traffic, even against a saving of 50 per cent. ? Yet that saving must be sacrificed altogether, before the Bristol Railway can expect to realize nearly six times more income from passengers alone, than the most favourable line in the kingdom.

“ In the waggon department of the BRIGHTON LINE, Sir John Rennie’s Committee estimate that they shall carry 154,534 *tr*

of profitable weight annually, not included in the first calculation ; to which may be added more than 300,000 tons of weight in machinery, waggons, &c., paying *nothing* to the shareholders, but increasing heavily the wear and tear of the vehicles as well as the road itself, whilst the charge for goods is not to be, as promised in the previous Prospectus, *less than five pence per ton per mile*, but about 50 per cent. more than the first estimate. Mr. Vignoles calculates to carry only about 90,000 tons at threepence per ton per mile, or 25 per cent. Cheaper !

In the coach department, the Committee of Sir John Rennie first calculated that they should clear 125,000*l.* per annum, or fifteen per cent., by carrying passengers alone at eight shillings each, say (having no data to guide us) about 416,665, which, after deducting 25 per cent. as the ratio of the income on the Manchester line, instead of about $44\frac{3}{8}$ per cent., leaves, exclusive of parcels, the profit as above stated. But the present estimate proposes only to carry 331,616 passengers at 10*s.* each, including fee to coachmen, being 85,049 passengers less than calculated a few weeks previously. Mr. Vignoles reckons to carry about 365,000 passengers annually.

" The gross profit by Sir John Rennie's line, is now stated to be $15\frac{1}{2}$ per cent., or only $\frac{1}{2}$ per cent. additional for carrying 85,049 passengers less ; and 154,534 tons of goods not included before. The Committee add 60 per cent. to the income of 122,427*l.* for expected increase of traffic, stated to be 73,014*l.* ; whilst in fact, had any one checked this calculation before it was published, it would have been proved *minus* 442*l.* !

" But this is not the only error. For the shareholders are led to believe, that the cost on the basis of the Manchester line expenditure, is 52,000*l.* ; whilst in fact, at $44\frac{3}{8}$ of the income, it is 78,353*l.*, being 26,353 short debited, thereby reducing the gross profit from $15\frac{1}{2}$ to about $11\frac{1}{8}$ per cent., and Mr. Vignoles makes the profit of the English line about 10 per cent.—*See* Statement No. 2.

" But granting to the full extent all the profit exhibited by both engineers, it can only be obtained so long as common road Steam Vans and Coaches are not running on the turnpike roads. For the moment elementary power is brought into use by such

vehicles, and half the common road be, in effect, turned into a Railway of stone instead of iron, like the one now proposed to be made by Colonel Macerone, and subsequently by Sir Henry Parnell, Messrs Telford, Macneill, and others, from London to Holyhead, it is perhaps not asserting too much, to say that the iron Railway to Brighton is not likely to pay much more than one per cent.

"The errors we have noticed in the Revenue Estimate for Sir John Rennie's line, furnish only another proof of the facility with which Railway Committees are *blindfolded* by their own servants, and this too not for want of talent or sound commercial knowledge in Committees; but owing solely to want of time, from other more important engagements: for that such blindness is not wilful, is guaranteed by the integrity and station in society of those whose names are used to catch the eye of monied men. Yet are we quite unable to explain why any enlightened body should be driven in this *small* metropolis to select clerks, not even able to cast accounts, so as to see that two and two make four, without exposing their employers to the charge of miscalculation.

"Little can be said as to Revenue for the WINDSOR LINE, as the promoters have wisely taken care not to reveal any thing in their estimate likely to lead to a detection of error. For neither the quantity of goods nor the number of passengers are disclosed, but the whole income is commingled in one round sum of 58,000*l.*; balance in favour of the company 25,000*l.*, or 8½ per cent., but debiting about 23 per cent. short of the actual expenses on the Manchester line! In justice, however, to the Committee, it should be stated, that they have exhibited a much nearer approximation to the scale of profit on the Manchester line, than appears in any one of the other estimates before the public; and doubtless, have spared no pains consistent with *other engagements*, to be quite accurate in the data upon which the profit they have shown is founded.

"It should be observed also, that the Directors of the Windsor Line, like those of the Manchester line, were under the same delusion as to the use of horse power; for the Treasurer of the former says, that although the first line was laid out in 1824, and

the second in 1825, it was not till 1828 that they decided whether elementary power should be employed.

"Other Railway Companies are getting up; one from SWANSEA to LONDON, THROUGH GLOUCESTER; another from the MIDLAND COUNTIES; and probably the whole 3,000 miles will be attempted. To show, for example, how utterly fallacious the line from South Wales must prove, every one knows, that the main object is to bring up coal and iron cheaper than it can be brought by sea. Now, the freight from Wales, varies from ten to twelve shillings per ton. The distance from Merthyr, where the most extensive Iron Works are carried on, is about 175 miles. The charge for carrying goods on the Manchester line, to pay scarcely two per cent. on the capital (*see* Statement, No. 2), is fourpence-farthing per ton per mile, for the half year ending the 31st December, 1831; consequently, the charge for carriage alone upon one ton of pig iron, or one ton of coal delivered by Railway to London, would be about three pounds one shilling and eleven-pence three-farthings per ton for the whole distance; thus adding at least 100 per cent. to the first cost of the former, and not less than 1000l. per cent. to the latter. The only question therefore is, can the inhabitants of London afford to pay such a price, merely to save the cost of keeping heavy stocks in the market, owing to the irregularity of water conveyance?

"Granting, however, that Rail Roads never will be carried into effect, still iron masters have nothing to regret, seeing that three-fourths of the whole capital sunk in their construction is not in iron, but in labour; surely then, it may not be unwise to re-consider the policy of supporting what is not profitable, and must, in the end, prove discreditable to themselves, instead of encouraging the two-fold form of Iron Boats and common road Steam Carriages, which will doubtless lead to a much greater consumption of their own commodity. For with a water line 3000 miles in length, ready for the general use of Iron Boats; and with more than nine times as great a length of common roads for Steam Carriages, equally ready for use, none of us can say how soon we may not see even our wooden walls changed for iron, and our horses in stage coaches for Steam engines; whilst the raw material will be brought to market, from

the mountains in Wales, by one method or other of Steam Transport, 100 per cent. cheaper than Rail Roads ever can convey it*.

"But, granting that all the Railways, in despite of truth and common sense, should be carried into effect, what is to become of those from the West when they reach the London end of their respective lines? Do the shareholders understand that they must borrow, besides all other sums proved to be wanting, a large capital to bring the goods from five to seven miles to the consignees at the East end of the metropolis? For ships cannot get to them; barges will be too dear with extra lines to reach some of them; cabs almost too expensive, even should the inhabitants be able to spare *time* enough to ride after the locomotives in them; instead of starting in *other kind* of Steam Carriages from *the very heart of the city*†.

"Nor is this all; for should the contemplated improvements be made and realized to the fullest possible extent, even to saving one-half of the whole cost for levelling, still would Iron Railways be quite unable to compete with other methods of Steam Transport, rapidly getting nearer and nearer to perfection, as the latter, in the end, must prove many times cheaper, and equally expeditious for passengers."

ESTIMATES FOR CONSTRUCTION.

"But having distinctly proved, in all the Railway Estimates for *Revenue* now before the public, the two-fold error of omission and commission, it remains only to prove specifically,

* In the First Number of the *Quarterly Journal*, this subject will be fully exhibited, under a general Review of the Iron Trade, past and present.

† Colonel Macerone has just been running his Steam Carriage for more than twenty days consecutively, from the corner of Regent Street, Oxford Street, for hire, to Edgware, Uxbridge, &c. and back. For some days he went to Acton and back, twice a-day; then going eight times a-day up and down Oxford Street, thronged with vehicles of every description, without the least annoyance, or alarm, to either man or horse.

and still more conspicuously, that the whole of the estimates for construction are not less reprehensible or vulnerable.

"The BIRMINGHAM estimate was first 1,500,000*l.*, then 2,000,000*l.*; afterwards 3,000,000*l.*, for a double line, that is eight single lines of iron Railway. The last change in the capital was 2,500,000*l.*; and the length is now said to be 115 instead of 112½ miles, the engineer having discovered the means of doing *half* the whole work, that is, for a single line, nearly three miles farther round, for only *one-sixth* less than his previous estimate for a double line. Yet there are those who publicly stake their critical accuracy on the fact, that the whole four estimates together will not be much more than enough for the first proposition; whilst four, if not five, engineers have added another million sterling to the last estimate.

"For the BRISTOL LINE, the capital was first stated to be 2,805,250*l.* then 3,000,000*l.*; cost of construction for this line is 1,887,960*l.* less than it would have been had the estimate been framed, mile for mile, the same as the Manchester one. See Statement No. 1.

"Yet there must be two Acts of Parliament for the Bristol line—two lists of dissentients—six committees—two out, and two in both Houses of Parliament—two law bills—two parliamentary bills—two bills for levels and sections—and two bills for engineering. Although, only one set of the last cost the Manchester Railway Company 50,000*l.* for 90 miles less distance; whilst the opposition alone to the Bill cost thirty or forty thousand pounds more. The Birmingham Railway Company we know paid 50,000*l.* for *losing* only one Act of Parliament—so that what the Bristol Railway Shareholders may have to pay for *gaining* two similar Acts of Parliament, it is quite impossible to calculate.

"The Committee of the Bristol line state that the locomotive will, in no part of the line have to surmount an inclination greater than 1 in 340, or 15 feet in a mile; and for the first 50 miles out of London, none greater than 1 in 528, or 10 feet in a mile—asserting that this approach to a level must render the locomotive engines '*much more effective,*' and subject them to '*less wear and*

tear,' than they are exposed to on the Liverpool and Manchester Railway, part of which line has an inclination equal to 1 in 98, or 53 feet in a mile.

"But, why were capitalists not told that instead of locomotives being '*more effective*,' and the '*wear and tear less*,' on the Bristol line, as compared with the Manchester line, it must be greater. For 'the road upon the whole between Manchester and Liverpool is so level,' says one account of the Railway by Mr. T. T. Bury, page 2, 'that, with the exception of two inclined planes at Rainhill, there is no greater inclination than in the ratio of about one in 880, or six feet in a mile: so that at the Liverpool end, it is only 46 feet higher than at Manchester*.'

"If, therefore, the expense of '*wear and tear*' is to be *less*, because the greatest inclination in the first 50 miles on the Bristol line is nearly *twice* as sharp, and the highest elevation in the next 70 miles much more than twice as sharp as any on the Manchester line, we can only add, it is *not* according to the creed of some of our most enlightened engineers, even if the engines were not to travel annually *six or seven thousand miles further*.

"But we shall now proceed to show some grounds for believing that neither the Birmingham nor the Bristol lines can ever be executed, without borrowing a very large additional capital, especially, should proper reservations be made, contingent upon the possibility of *four* lines being ultimately inevitable.

"It should, however, be borne in mind that although we have drawn up Statement No. 1, exhibiting the *cost of construction*, mile per mile with the Manchester line, we are not so foolish as to insist that each particular item should be the same; only we know no better way generally to bring about a *right understanding* of the whole case.

"*Land*.—On the BIRMINGHAM and BRISTOL lines the cost for

* But as Manchester is nearly on a level with the sea at Liverpool, it seems an extraordinary piece of engineering to have carried the Railway to a point forty-six feet above that level at Liverpool. All the sea-borne goods going to Manchester have first to be raised to that level, and all going from Manchester to Liverpool must experience the same obstacle.

surface must be much greater mile for mile with the Manchester line, and other reasons are assigned for this under the head of 'Earth-work.' For the land along the latter is principally of little value, compared with the major part of both the former lines, including a long line of some of the finest land in England, having increased value given to it, by anticipated facilities from railway conveyance. Nor are these facilities likely to be less highly rated *since*, than *before*, any similar communication existed. For the owners now see that 'veins of water will be cut, springs dried up, and many of the sloping fields along the lines so deprived of water that they will become sterile and unfit for pasturage; or the stock driven to a distance for a supply, greedily to its own injury, and with much additional cost.'

"Besides, 'whole estates and fields will be torn asunder by immense gashes and mounds, over and under which expensive bridges and long and wide tunnels must be constructed, or the value of the land will be still more deteriorated.'

"So convinced are the land-owners that their estates are threatened with destruction, that the nobility and gentry in Berkshire and Buckinghamshire only recently held a public meeting, at which the Marquis of Chandos presided, when it was unanimously resolved, that Railways were wholly unnecessary—not wanted—and the Representatives were instructed accordingly to oppose all the Bills for the Western Railways in Parliament.

"But granting that the Bristol and Birmingham lines are forced into execution, the quantity of land will prove greatly under-rated. Mr. Walker states in his evidence, that the Leeds and Selby Railway Company have, by his advice, purchased land sufficient for a double line eventually: and the Stockton and Darlington Railway Company have been equally wise in the arrangements.

"Mr. Cubitt agrees with Mr. Walker, that land should be purchased for four lines; because the greater the length of line, the greater the necessity for it; and the Manchester and Liverpool Railway Company prove this by constantly increasing and carrying on enormous embankments.

"Mr. Walker estimates that the additional quantity of land

for the Birmingham Railway would increase the cost 60,000*l.*; and Mr. Gravatt estimates the land for the latter to be not 1250 acres, as calculated, but 1749 acres, exclusive of depôts, stations, and bridges; whilst the land for the Bristol line may prove in the end equally deficient. Yet the cost for surface on the Birmingham and Bristol lines, mile for mile with the Manchester line, is estimated to be 193,255*l.* or full 24½ per cent. less!

Note.—All the surveyors *against* the Bill, estimate the land at 63,000*l.* more than those *for* the Bill; and including the sum estimated for four lines, the *extra* cost will be 123,000*l.* for one of the lines only, that is, provided the owners themselves do not show ground for a still higher valuation.

Bridges.—On the Birmingham line alone there will be, according to Mr. Stephenson, jun. 404, but by all the engineers for the Petitioners, 466 bridges, including 29 over rivers and canals, and *four over the Thames*; whilst the Manchester line has only five over inferior waters; one of which alone, the Sankey Viaduct, cost 50,000*l.* The rest, that is 437, are over roads; whilst the Manchester line has only 58, and many of them neither so wide nor so long as those will be for the other lines mentioned. Besides which, the expense for masonry and carriage of materials will be much greater. The number of bridges are not given for the Bristol line, but they are not likely to be less numerous; and the culverts for both lines at least 500. Yet the whole cost, mile per mile with the Manchester line is estimated to be 25,091*l.* less!

Note.—Mr. Macneill estimates the bridges at 104,410*l.* more than Mr. Stephenson, jun.

Earth-work.—On the Birmingham and Bristol lines, the substratum being soft and slippery, the embankments will require to be considerably more than Mr. Stephenson has estimated, at least, in the opinion of four engineers named in our concluding case; whilst much of the sloping to the cuttings will require three in the base to one perpendicular.

"It is true that Mr. Stephenson, jun. did not originally estimate his slopes to be so great, calculating all the embank

ments 2 for 1 ; and for the cuttings, varying from $\frac{3}{4}$, 1, $1\frac{1}{2}$, and 2 to 1 in the London clay. Owing, however, to the necessity for adopting the *black* instead of the *red* line section, he has since been forced to *increase* both.

" All the engineers against the Bill agree, that no embankment in London clay will stand at less than 3 to 1 ; at Primrose Hill, indifferently at 4 to 1 ; Grand Junction Canal, at Wormwood Scrubs, 3 to 1 ; Barnet, now slipping, at 3 to 1 ; Brent Embankment, 3 to 1. The slopes to the cuttings at Ridge Hill, between Colney and South Mims, are slipping at 3 to 1 and 4 to 1 ; at Paddington Canal they will not stand at less than $2\frac{1}{2}$ to 1, and 3 to 1.

" The total quantity of *earth-work*, or cuttings on the Manchester line, was 3,405,000 cubic yards, or 113,500 cubic yards per mile. The Great Roby Embankment, which carries the railway across a valley of that name, about two miles, varies in height from 15 to 45 feet, and in breadth, at the base, from 60 to 135 feet. The largest cutting in stone is 70 feet deep through the solid rock of Olive Mount, nearly the same distance, while from the Kenyon excavation alone, 800,000 cubic yards of sand and clay were not only dug out, but *carried away*, to form the neighbouring embankments.

" The total quantity of *cuttings* and embankments for the Birmingham line, according to Mr. Walker, is not less than 29,237,320 cubic yards ; and as the cuttings alone are 18,488,265 cubic yards, or 160,767 cubic yards per mile, the latter proves to be 47,267 cubic yards *more*, cutting mile per mile, than on the Manchester line, or 6,803,265 cubic yards *more* than Mr. Stephenson, jun. has estimated. On the Bristol line the earth-work is not given, or the *excess* quantity mile for mile with the Manchester line might prove equally extraordinary. The total cost of this item, by Mr. Walker, for the Birmingham line alone, is 1,119,163*l.* or 340,163*l.* *more* than Mr. Stephenson, jun. ; and if to this be added the earth-work for the Bristol line, the total cost for both lines (merely for levelling) will be very near the aggregate amount, mile for mile, with the Manchester line, in Statement No. 1. Yet, strange to say, the Railway

estimates for both these lines, mile for mile with the latter, are 402,991*l.* or full $22\frac{1}{2}$ per cent. less !

“ But to show how little dependance is to be placed on calculations respecting earth-work, it should be remembered, that the original estimate for the embankment at the London-end of Barnet, though only a mole-hill compared with railway embankments, was 4000*l.*, yet the actual cost paid was 14,000*l.*, or more than treble ; whilst the excavations for the Highgate Archway, which were estimated at 30,000*l.*, actually cost nearly four times that sum.

“ In speaking of ‘ *cuttings and embankings* ’ on the Birmingham line, ‘ Investigator ’ (probably one of our ablest engineers) observes, p. 81, ‘ that they would occupy a greater breadth, arising from the nature of the soil.’ There is scarcely a mile of the line that any ‘ eminent engineer ’ would expect to stand, at a less slope than two of base to one of perpendicular ; and there is evidence, that the London clay, the chalk, the plastic clay, the Oxford clay, and the oolite, which occupy full 70 miles of the line, must have a slope of two and a half base to one perpendicular ; otherwise, there must be continued danger of slipping in the excavations, and especially the embankments. The remaining 30 miles pass over the lias formation, and every one who knows any thing about geologic structures knows, that the surface of that formation is flat ; consequently, the railway will, or at least should, be carried in a level across the whole of that formation. It is, therefore, evident, that the ‘ *deep cuttings and embankings* ’ must be wholly through the *soft* strata, the clays and the oolite ; and that the slopes there must have the breadth as before stated.

“ *Tunnelling*.—On the Birmingham line there will be ten tunnels, measuring about 7876 yards. The number of tunnels for the Bristol line are not given, although we know, that only one tunnel on the Manchester line is estimated to cost 130,000*l.*, yet the expense, mile for mile with the latter, is stated for the Birmingham and Bristol lines to be 868,303*l.*, or full $63\frac{1}{4}$ per cent. less !

N.B.—Mr. Macneill estimates the tunnelling for the Birmingham line at 101,164*l.* more than Mr. Stephenson, jun.

“Ballasting, Blocks, and Rails.—The iron for the rails of the Birmingham and Bristol lines is to be half as heavy again, and, as compared with the Manchester line, according to the present price of iron, considerably dearer. Every part of the Manchester line is near coal, iron, stone, and every requisite for the Road; whereas *no iron* is made along either of the other two lines; nor is there any coal, except at a great distance, or single foot of stone fit for blocks within many miles of the Birmingham line, though the Bristol line in the latter respect better provided; so that the inland carriage alone will be a trifling addition to the cost—one-fifth, at least, besides other considerations; yet, the expense, mile for mile with the Manchester line, is estimated to be 150,183*l.*, or full $12\frac{3}{4}$ per cent. less!

“Note.—Mr. Macneill estimates this item, for the Birmingham line, at 135,466*l.* more than Mr. Stephenson, jun.

“Drainage.—Mr. Macneill estimates this item, for the Birmingham line, at 50,280*l.* But we do not find it noticed at all in either of the estimates for the Birmingham or Bristol lines.

“Fencing.—The cost for fencing on the Birmingham line is estimated to be 76,032*l.*; yet, in the Bristol estimate, this item is not even named.

“Note.—Mr. Macneill estimates the fencing for the Birmingham line at 40,843*l.* more than Mr. Stephenson, jun.

“Stations, Dépôts, and Warehouses.—The Birmingham traffic is greater than that for the Bristol line; yet the cost for the former is estimated to be 231,400*l.* less than the latter; while the expense for *both* lines, mile for mile with the Manchester line is estimated to be 279,300*l.*, or full $50\frac{3}{4}$ per cent. less!

“Note.—Since making up Statement No. 1, we find that Mr. Booth asserts, in his evidence before Parliament, that this item cost 200,000*l.*, and not 70,228*l.*, as given in his own account of 31st May, 1830. This will increase the expense per mile to 6666*l.*, and make the aggregate cost mile per mile of the Birmingham and Bristol lines equal to 1,566,510*l.*, being 1,295,910*l.* more than the estimates for those lines; and, consequently, it will diminish the item for contingencies exactly in the like ratio

leaving the general result the same. It is not however presumed, that any fair comparison can be made, as regards either of these items, mile for mile with the Manchester line, particularly 'contingencies,' as doubtless the outlays for other items are included; still, enough is shown to justify a suspicion at least, that the estimates for the Bristol and Birmingham lines are *minus* to a considerable amount.

" *Engines, Coaches, &c.*—The number of passengers expected to be carried on the Birmingham and Bristol Railway united, appears to be about 1,149,767, or nearly treble the number ever yet carried, in the most productive year, on the Manchester line; yet the cost of the *former* is estimated to be, mile per mile, 269,165*l.*, or full 65 $\frac{3}{4}$ per cent. less!

" *Interest.*—The interest sunk on the outlay, during construction, is *omitted* altogether in all the Railway estimates, making those for Birmingham and Bristol lines, mile for mile with the Manchester line, 783,255*l.* less!

" *Contingencies.*—The Capital of the Birmingham and Bristol Lines, united, is stated to be, according to Mr. Macneill and other engineers, for the former, nearly 5 $\frac{1}{2}$ times greater than the Manchester line; yet the sum allowed for contingencies, mile per mile with the latter, is estimated to be 1,099,712*l.*, or full 58 $\frac{1}{2}$ per cent. less!!!

" Thus making, in the aggregate, a total saving of 4,071,255*l.* in only 235 miles; a sum so enormous, that no man, with ordinary pretensions to *credulity* for Railway speculation, will be found to give credence to it.

" But granting that such enormous savings, exceeding *four millions* sterling, can be made, that is more than the whole estimated cost of four Railways from London to Southampton, still have the public ample grounds for withholding their investments, seeing how little dependance is to be placed on the random calculations of some of our 'most eminent' engineers.

" For the SOUTHAMPTON LINE, the capital is stated to be 1,000,000*l.* or 2,136,441*l.* sterling less mile per mile than the Manchester line, the difference being enough per estimate, to

make two whole Railways from London to Southampton, in length 154 miles!

"It is true, that with regard to the Southampton line, the first 50 miles out of London may not be more expensive to construct than the Manchester line; but beyond Basingstoke, the cost, mile per mile, in many of the items, is likely to be much heavier. For on this line there is one tunnel between two and three thousand yards long, with 84 feet of deep cutting at one end, and 77 feet at the other; in fact, both longer and more extensive in depth of cutting than the great tunnel on the Manchester line (2243 yards), where the miners refused to proceed; and frequently the engineer himself was unable to keep them at their posts, so great was the dread of being buried alive, even in the field of their daily bread; the land also must be greater in quantity and value; bridges more numerous and costly—one, if not two, over the Thames; earthwork, many million cubic yards greater; iron rails, more in quantity, weight, and price; whilst the interest alone, during construction, will not be much less than 150,000*l*.

"To prove that the most respectable engineers are not always infallible, Mr. Giles, engineer for the Southampton line, stated, in his evidence before Parliament, that the total amount of deep cuttings, to make the road level on the Manchester line, would not be less than 4,545,000 cubic yards; whilst in fact, the Treasurer proved, after the work was executed, that the total quantity did not measure more than 3,405,000 cubic yards, being just 1,140,000 cubic yards less than estimated by Mr. Giles.

"It is in evidence also, by the same authority, that the cost of the whole of these cuttings and embankings would not be less than 270,000*l*., whilst in fact, the Treasurer proved, after the work was completed, that the whole expense was about 199,763*l*., thus proving a second error, equal to 70,237*l*. Nor was this all; for the same gentleman asserted, that no engineer in his senses would ever think of making a Railway through Chat Moss on the Manchester line—a vast bog, covering an area of twelve square miles—having no doubt the cost would

not be less than 200,000*l.* ; whilst, in fact, Mr. Stephenson, sen. did make a Railway through this Bog, five miles and a half long, without losing, as far as we know, any one of his senses. But instead of the expense being 200,000*l.* it stands roundly in the Treasurer's account only 27,719*l.* ; thus proving the third error to be equal to 172,281*l.* ; and also, that one of our most eminent engineers was *out* altogether in the two items of 'Earth-work' and 'Chat Moss' for the Manchester line, not less than 242,518*l.* sterling.

" For the WINDSOR line, the capital is estimated to be 300,000*l.* or 514,660*l.* mile per mile less than the Manchester line. It may be quite sufficient to state, in addition to some of the reasons already assigned for other Railways, that the land alone is not unlikely to cost one-third, at least, of the whole amount estimated.

" The Directors of this Windsor project undoubtedly feel quite convinced that the Southampton and Bristol lines *never will be executed*, or they would hardly have laid down a third line only a few hundred yards apart, thereby exposing the Windsor 'fair one' to the danger of falling into the arms of one or other of her rivals ; so that the shareholders never could expect to obtain a single favour. But like a ship foundering between Scylla and Charybdis, she would leave only the 'wreck behind.'

" For the Brighton line, there are two plans, one by Sir John Rennie, the other by Mr. Vignoles, both engineers of well known eminence. But as two lines, to bring Paris within fourteen or fifteen hours of London, *viz.* Shoreham and Brighton, can never pay two sets of shareholders, we presume the best line alone will be adopted ; and the sooner the problem is solved, the better for all parties, except solicitors, engineers, and surveyors.

" With regard to the total cost, both engineers are likely to find it considerably nearer, mile for mile, that of the Manchester line, than what they estimate. Yet, Sir John Rennie states the whole expense of his line to be 920,000*l.* and Mr. Vignoles, 1,000,000*l.* sterling ; the former being 1064,451*l.* less than the Manchester line, and 80,000*l.* under Mr. Vignoles, though it must be self-evident, that the line by Sir John Rennie, is by 1

the most costly. For Mr. Vignoles admits, that the land alone to get over the first few miles from London, will cost 200,000 whilst the Bridges over and under roads, and across waters, Sir John Rennie's line, will be nearly three times more numerous than on the Manchester line.

" We have carefully examined both plans at the office of Clerk of the Peace ; and no one can take equal pains to be correct, without being struck with the marked superiority of the line laid down by Mr. Vignoles. The following facts may justify that assertion.

" It is admitted in the prospectus, though not in the copy of the section given, that the greatest inclination from a level to the line by Sir John Rennie was 1 in 200, or $26\frac{1}{4}$ feet in a mile but the Committee, following the example of the Bristol & Glos. promoters, add, that this rise is only for one mile and a half so that the public may run away with the notion that all the incline is equal to an iron bowling green.

" The *reverse*, however, is the fact ; and although we do not presume to assert that Sir John Rennie may not differ with the following gradients, when compared with any fresh calculations yet are we disposed to believe, that he will not alter *very materially* the actual results, so that all parties interested may at least more clearly *with*, than *without* these figures, how the cases really stand."

MANCHESTER RAILWAY, and

MILES, AND BRISTOL 120 Miles.

Miles.		Rate per Manchester and Liverpool Line, Mile for Mile.	
le.	Total.	Less.	Total.
	£.	£.	£.
0	590,000	193,255	783,255
2	825,374	25,091	850,465
8	1,379,014	402,991	1,782,005
0	2,794,388	621,337	3,415,725
0	500,572	868,303	1,368,875
1	1,015,592	150,183	1,165,775

1	270,600	279,300	549,900
3	139,500	269,165	408,665
	....	783,255	783,255
6	779,348	1,099,712	1,879,060
1	5,500,000	4,071,255	9,571,255

Manchester Rail- le.	Total actual Cost, same as Manchester and Liverpool Rail- way, Mile per Mile.
	£.
	1,222,054
	4,684,295
	4,887,960
	3,136,441
	1,914,451
	814,660
	16,659,861

fractions have been rejected for brevity.

20,397	.....	£.7,034
20,397	.....	5,629
00,000	.....	21,212
81,061	.....	28,868
99,249	.....	20,925
39,175	.....	11,823

Total under-rated..95,491

Share interest to the opening of the Railway in September
more than 100,000l.

POOL RAILWAY, for Two Half Year

COACH DEPARTMENT.

TIM	TRIPS.		EXPENSES.			RECEIPT		
	per	Total Miles.	Passen- gers.	Cost each.	Rate per ct. of Income.	Amount.	Charge each.	Am
			No.	s. d.		£.	s. d.	s
31 Decembe		88,520	256,321	2 0½	44½	25,930	4 6	58
Increase or		9,340	84,900	0 10½	11½	1,289	0 7½	14
30 June, 18		97,860	171,421	2 10½	55½	24,641	5 1½	44
Total for 12		186,330	427,742	..	..	50,571	..	102

STATEP calculated in the ratio of the Expenditure in RAILWAY.

COACH DEPARTMENT

	EXPENSES.			RECEIPT		
	Passen- gers.	Parcels.	Posting.	Rate per ct. of Income.	Amount.	Charge each.
	No.	£.	£.		£.	s. d.
Bristol ...	504,236	..	..	44½	268,129	20 0
Birmingham	543,331	23,360	15,330	..	236,307	18 8
Southampton	543,831	..	..	..	150,833	12 6
Brighton an	331,916	2,847	11,014	..	75,665	10 0
Brighton ar	653,000	..	..	..	64,787	8 0

* The capita
† Assuming
department wil
‡ Including

seven away for sheep, and 46,410, over credited from fly boats, be

The following may be regarded as a fair comparison of the cost of common road Steam Carriages, of the Rail Road carriages, and of Horse coaches. The two latter estimates are founded on uncontrovertible facts; the first is certainly more or less conjectural, but it must be observed that it includes the first cost of the formation of the stone-ways on all roads, which I originated in the first edition of this pamphlet. This first cost of the stone-ways is estimated at 150,000*l.* which in my opinion is far more than it would cost according to my proposal, p. 73.

ESTIMATED CONVEYANCE BETWEEN LONDON AND BIRMINGHAM.

Steam Carriages on the Turnpike Line.

Passengers daily.	Capital invested, including the outlay of the making of the stone road.	Profit per cent.
500	£350,000	20

Steam Carriages on the Railway.

1424	£3,500,000	8½
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Stage Coaches.

550	£120,000	10
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The difficulty of constructing Carriages capable of running on *common* roads is certainly very, very great; it has, however, at length been achieved. It is, on the other hand, comparatively easy to make such as will act well on a rail road. The disparity in the two cases is singularly exemplified in the fact, that not one of the locomotive engines which perform such “wonders” on the Manchester rail road, can, according to the authority of the engineers examined on the committee of the House of Commons, on Steam Carriages, above alluded to, work, even at the rate of a mile an hour on a common road; indeed, it is doubted whether they would move at all. None of the celebrated engineers, who have constructed them, have produced a boiler that can bear more than 50 or 60 pounds pressure to the square inch; while, to *duly* propel a carriage on a common road, with an engine

boiler of convenient size, a pressure of 150 to 200 pounds to the inch is indispensable. The boilers too, of the Rail Road engines are far from being on a *principle* of safety. They are all recipients of large diameter, containing a great mass of water, strong merely by thickness of metal; but sure to commit sad havoc, should they happen to burst. On the other hand, the boiler patented last July, by Mr. SQUIRE and myself, as well as Mr. GURNEY's, Mr. OGLE's, and some others, whose Carriages have not been so successful, are constructed on a *principle* of separation and division, which render it next to impossible that an explosion should occur; and further, should such explosion (or, rather, opening) take place, it absolutely *cannot* do any harm, save the stopping of the progress of the vehicle*.

It having been proved that Steam Carriages are capable of travelling on common roads, at a far cheaper, and at a more rapid rate, than horse coaches, it remains to inquire how far they may be made to supersede the necessity of Rail Roads, in situations which are not of that exclusive nature as applies to the Liverpool and Birmingham line. In England, Ireland, and Scotland, the roads are all sufficiently good for the proposed substitution. On the continent of Europe, however, there certainly are many roads, where deep sands, soft clay, deep ruts, and broken-up pavement, would present great difficulties. Such, however, is not the state of the principal high roads. In France and Belgium, most of the high roads are paved. If such pavement be tolerably even, it will take only one-third of the power to propel Steam Carriages thereon, which is required on the best unpaved road in England. The unevenness of the

* The Rail Road engines on the Manchester and Liverpool line cost, on an average, "fifty pounds a month each, in repairs!" Out of twenty carriages in hand, they have often had only six in a working state! It can be proved, that the carriage produced by Mr. SQUIRE and myself has run on the *worst common roads* seventeen hundred miles without requiring *any* repair!

pavement may render very rapid going injurious to the machinery—but that will only be a question of speed ; and all the parts of a Steam Carriage intended for such a road, should be made stronger than for unpaved roads. Heavy goods can be carried in large Steam Waggons, on *paved* roads, far better than on unpaved ones, especially as the rate of three or four miles an hour would be amply sufficient. On a good even pavement, a Steam Carriage would travel, at fourteen miles the hour, with more facility than on the best unpaved one at eight. I have shown in my work *Hints to Paviours*, published by EFFINGHAM WILSON, how all paved roads may be made and maintained as level as a billiard table, with less expense than occurs according to the present wretched system.

There is a certain, infallible, and very cheap method, by which almost every advantage of the Rail Road might be applied to every ordinary road. If two lines of pavement, composed of stones, six or eight feet long, and one to two feet square, were laid endways, along each side of the road, a track would be formed, at a very cheap and durable rate, along which our Steam Carriages would most undoubtedly easily travel, at the average rate of twenty miles the hour. There need be no levelling of hills—no filling up of hollows—no levelling of any kind ; nothing but to keep to the surface of existing roads. The two lines on one side would be for Steam Carriages going one way ; the other lines, for those travelling in the contrary direction. If the road be kept on a level or “flush” with the surface of the long stones, the carriages could easily quit the stones for any momentary necessity. A well-paved road is a good thing itself ; but a road to which such lines of long stones shall be applied, will allow of a velocity equal to that of a Rail Road, at one hundredth part of the expense. All ordinary hills will be ascended and descended with ease and rapidity ; and the road will be equally open and serviceable or horse carriages.

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of pavements I beg to repeat I have written
to which I beg leave to direct the attention of
he will see that a paved road may, by a simple
which I propose, be made and kept con-
and smooth, in fact, to become better and better
and with diminished cost. With regard
and tear of the long stones, or parallopepidons,
I recommend to be laid on all high roads for the use
carriages, no inconvenient wear will take place on
for the space of several years. When it
will be required, will be to turn them over so as
a new side to the surface ; and after another lapse
to do the like, until all the four sides have been
their turn. After this, the parallopepidons may be
turned to the stone-mason's chisel. In laying these long
of stone, care must be taken that they do not sink so
form disjunctions at their ends. To this effect, piles of
of at least a foot square, and from two to three feet long,
previously soaked in hot coal tar, must be forcibly driven into
the road, with a pile driver or " monkey," so that the ends and
the middle of each of the long stones shall rest on the surface
of the pile, by which means, if they sink at all, they will both
sink equally and together. Such piles would last many years,
but blocks of hard stone driven down in the same way would
obviate all objection of decay. But on the construction of
such roads, I shall treat more at length and more minutely,
when required, at a future period ; I will only repeat, that
*I will undertake, under any penalty, to construct Steam
Carriages for £.750 each ; which along such a road, whether
hilly or level, shall carry at least fourteen passengers, with
their luggage, and extra parcels, at the average rate of
TWENTY MILES THE HOUR, with ease and safety.*

During the course of this last spring, an Association has
been formed in England for the Promotion and Encourage-
ment of Locomotive Power. It has been established on the

supposition that the experiments already made with the Steam Carriages alluded to in the foregoing pages, were quite sufficient whereon to found the axioms expressed in their prospectus, here below given. The members, however, of the Provisional Committee, at the period of its meetings, had no knowledge of the Steam Coach constructed by Mr. SQUIRE and myself, which, in fact, was only patented in July 1833. The following is an abstract of the prospectus of the Association.

INSTITUTION OF LOCOMOTION

FOR

STEAM TRANSPORT AND AGRICULTURE.

At a preliminary Meeting of Noblemen and Gentlemen, held in FENDALL'S HOTEL, Palace Yard, 23rd of April, 1833, in order to form a Society for the above important purpose,

HENRY HANDLEY, Esq. M.P. in the Chair;

It was moved by COLONEL TORRENS, M.P., seconded by J. W. CHILDERS, Esq. M.P., and unanimously resolved:—

That the application of Steam to inland transport and agricultural purposes, will, by cheapening the production, and saving the consumption, of the food of the country, be accompanied by advantages to all classes of the community, of the most extensive and permanent utility; and that, as such, this Meeting considers it highly entitled to their support, and that of Society at large.

It was moved by C. SHAW LEFEVRE, Esq. M.P., seconded by W. R. KEITH DOUGLASS, Esq. and unanimously resolved:—

That the practicability of applying Steam to general locomotive purposes, was satisfactorily proved by evidence before a Committee of the House of Commons, in 1831; who reported the same to be “practical”—“safe”—“one of the greatest improvements in the mode of internal conveyance ever introduced”—and “entitled to legislative protection;” and that, since that time, it has been further and fully established by numerous successful experiments.

It was moved by LEONARD S. COXE, Esq. seconded by W. P. BRIGSTOCK Esq. M.P. and unanimously resolved :—

That this Meeting considers it desirable that an Association be formed for bringing the measure forward in the prominent manner which its own importance, political and commercial, and the exigencies of society require:—to be “A Society for Promoting the Application of Steam to General Transport and Agricultural Purposes;” and that the following Noblemen and Gentlemen act as a PROVISIONAL COMMITTEE, to carry the Resolutions of this Meeting into immediate effect.

W. R. KEITH DOUGLAS, Esq.
SIR ANDREW AGNEW, BART. M.P. } Trustees.
HENRY HANDLEY, Esq. M.P.

RIGHT HON. THE EARL OF KENMARE.
RIGHT HON. THE EARL OF KERRY, M.P.
RT. HON. LORD VISCOUNT MORPETH, M.P.
RT. HON. LORD VISCOUNT SANDON, M.P.
HON. LORD OXMANTOWN, M.P.
SIR JOHN SEBRIGHT, BART. M.P.
SIR GEORGE CAYLEY, BART. M.P.
SIR JAMES BROWN, BART.
SIR CHARLES LEMON, BART. M.P.
SIR HARRY VERNER, BART. M.P.
LIEUT.-GEN. SIR THOMAS BROWNE, K.C.H.
COL. SIR HENRY WATSON, K.T.S.
MAJOR-GEN. CHARLES PALMER, M.P.
C. SHAW LEFEVRE, Esq. M.P.
P. MAXWELL STEWART, Esq. M.P.
EDWARD ROMILLY, Esq. M.P.
C. D. O. JEPHSON, M.P.
JOHN BROWNE, Esq. M.P.

J. W. CHILDERS, Esq. M.P.
COLONEL TORRENS, M.P.
JOHN HARDY, Esq. M.P.
W. B. BARING, Esq. M.P.
W. P. BRIGSTOCK, Esq. M.P.
WILLIAM HYETT, Esq. M.P.
THOMAS BISH, Esq. M.P.
ANDREW JOHNSTON, Esq. M.P.
GEORGE TRAILL, Esq. M.P.
J. S. BUCKINGHAM, Esq. M.P.
R. A. SLANEY, Esq. M.P.
W. A. MACKINNON, Esq.
LEONARD S. COXE, Esq.
THOMAS FARNCOMBE, Esq.
CAPTAIN CHEYNE, R.N.
ROBERT DOBIE, Esq.
CHARLES MAWLEY, Esq.
WILLIAM DUNDEE, Esq.

The above-named “Provisional Committee” were, they said, going to do great things towards the encouragement of that which they rightly stated, was a matter of great national importance; but all they did was to “imprint their names,” to show that they honoured the undertaking of such “extensive and permanent utility” with their approbation and good wishes. Some of the above gentlemen have since merged into a Company called the “London and Holyhead Steam Carriage and Road Company.”

The following are two different accounts of some of the performances of our Steam Carriage, *which continues to run every day, without any interruption from derangements.*

" True Sun, Oct. 5, 1833.

"STEAM CARRIAGE.

" Colonel MACERONE and Mr. SQUIRE, accompanied by eight other gentlemen, took a trip yesterday in their new Patent Steam Carriage, from Paddington Green to Edgware. The average speed, whilst the vehicle was actually running, was more than sixteen miles an hour; including stoppages, it was nearly equal to fourteen miles an hour. The return from Edgware to Paddington Green, a distance of seven miles and a half, was performed in thirty minutes, twenty seconds, although eight minutes of that time were consumed in taking in water, and three minutes in adjusting the band which works the blower, and which had slipped off. The machine by which this experiment was made has gone to Windsor in two hours, including stoppages. It appears to be the simplest and most compact Steam Carriage that has yet been tried in public. It is capable of carrying twelve or fourteen persons fourteen miles an hour, including all stoppages, with perfect safety, on a turnpike-road. The facility of turning, stopping, and regulating the speed, is infinitely greater than the most accomplished whip on any of the roads could attain in driving a one-horse chaise. The Carriage of Messrs. MACERONE and SQUIRE could be guided with perfect security through Fleet Street and Cheapside, at the most crowded time of the day. The reduction which this invention will effect in travelling by turnpike roads, may be conjectured from this :—The expense of building a four-horse Stage Coach is about £.250; the expense of a Steam Carriage to carry the same number of passengers as the Stage Coach, will be under £.750; but the expenses of a common Stage Coach, with four horses, amount to 4*s.* 9*d.* a mile, whereas the expenses of the Steam Coach are no more than 4*d.* a mile at the utmost; and the cost of repairing the machinery, and of other casualties to the Steam Coach, could not be compared to the expense and risk of keeping up a stud of one hundred horses, the least complement with which a Stage Coach can be worked a hundred miles a day. The Patentees claim for their invention a great superiority over the tubular boilers of Mr.

GURNEY. They say that whilst they have attained an equal degree of security, they have avoided the fatal defects of the tubular boilers, which, in consequence of the unavoidable unequal distribution of the heat, throw in a quantity of water with the steam into the cylinders, and cause a great irregularity in the action of the pistons, and in the speed of the Carriage."

"*Morning Chronicle*, Oct, 7th 1831

"STEAM TRIP TO EDGWARE.

"The Steam Carriage belonging to Mr. SQUIRE, and Colonel MACERONE, which we mentioned some time ago as having been to Windsor and back, has had the misfortune (of breaking the axle-tree) repaired, with which that trip terminated, and has been for some time again running on the Edgware and neighbouring roads. On Monday last, it again carried a party down to Windsor, and after they had dined there, it brought them again safe back to town. *Since Monday, it has run to Edgware and back every day*, and we had on Saturday the pleasure of witnessing its performance. It started from Paddington at half-past three o'clock, and ran down to Edgware, a distance of eight miles, as near as possible, from the point of starting, and returned to that point in an hour and fifty minutes; performing sixteen miles in that time, including stoppages. The Carriage stopped twice to take in water, which consumed a considerable time, much more than under proper regulations, there will be any necessity for*. These two stoppages consumed about thirty-four minutes; so that the sixteen miles were actually passed over in seventy-six minutes, or at the rate of four minutes forty-five seconds per mile—being an average speed of fourteen miles an

* When proper stations for coke and water are established on the roads, the water tanks, or butts, will be so placed as, by means of a leather hose, to fill the Steam Coach tank in the space of a minute. At present, having to do it with buckets, it causes the sad loss of time above complained of.

hour, exclusive of stoppages. Some single miles were passed over in three minutes and a half. Including stoppages, the speed was nearly nine miles an hour. With proper arrangements, these stoppages, for any length of time, may be avoided; and the speed with which the Carriage can conveniently travel, including all stoppages, may safely be assumed as upwards of twelve miles an hour. On the Edgware Road there are two smart hills, on one of which, called Red Hill, there was a complete layer of loose gravel; and up these hills the Steam Carriage went with a considerable, but a diminished, velocity—we should suppose, at the rate of eight miles an hour. The trip was in all respects successful, and, the Carriage being as easily managed as a child's cart, the speed may be checked or continued at pleasure. Such performances set the question of the practicability of employing Steam Carriages completely at rest. The advantages of the contrivance now only becomes a question of cost, which we must leave to be settled by the coach masters, and those who propose to run Steam Carriages*."

Subsequently to the appearance of the first edition of this Pamphlet, Sir Charles Dance has run his Steam Carriage four or five days following, between Waterloo Bridge and Greenwich, a distance of five miles of the hardest and most level road in England. On the fifth or sixth day (I forget which) he withdrew his Carriage, totally disabled. It was then stated, that certain "scientific gentlemen" had borrowed it of him, in order to achieve with it a grand journey to Birmingham. After several weeks employed in repairing the Carriage, establishing the stations for *coke and water*, scraping the roads, and *placing horses to help the Carriage up the hills*, it started from London in November, 1833, at two o'clock, A. M.;—arrived at Highgate—the boiler burst again—however, it managed to get on to Stony Stratford, a distance of 52 miles, when the undertaking was given up. On Monday the 2nd of last December, Sir Charles

* See p. 34. This report was written by Mr. Hodgkins, now Editor of the *Courier*.

again commenced running from the same place, "Stear Coach Office," Waterloo Bridge, to Clapham, a distance also of five miles, on a road as hard and as level as that to Greenwich. On the following Wednesday, Mr. Summers, the engineer, of Southampton (co-patentee with Mr. Ogle), rode in the Carriage, and states that he was just on hour in going the five miles of cast iron billiard table. The next day, the boiler again gave way, and the travelling ceased. *But as no reporters from the Newspapers were requested to attend, and the ending of the affair was not announced, as the commencement had most diffusely been the public, especially on the Continent, very innocently though naturally enough, imagine that this Carriage is running still!* With regard to the Carriage patented by Mr. SQUIRE and myself, it has, since the dates of the above reports of the *True Sun* and *Morning Chronicle*, been in a state of almost continual activity, as will be seen from the Editorial testimonials in the Appendix. For more than a fortnight it started daily and regularly from Regent Street, Oxford Street, either to Uxbridge or Edgware, or twice a day to Acton; thus going, eight times a day, up and down Oxford Street, crowded with the usual multitude, and congregated vehicles and horses, without causing the slightest alarm or accident on any one occasion*. The only interruption we had was on Saturday, the 11th of January, when, owing to the tire of one of the wheels breaking, in the middle of Oxford Street, we were obliged to go back to the factory to take it off, and weld it; which caused a considerable delay and disappointment to a crowd of expectants, who did not wait the arrival of the Carriage in Regent Street, more than two hours after its usual time.

Any thing further that it might be thought necessary for me to show on the subject, will be found in the Appendix,

* See Appendix.

under the head of "*Macerone v. Mechanics' Magazine.*" Those who feel any interest in the subject of Elementary Locomotion, will read that Appendix with attention. Those who do not, will not buy this little work—for such it is not written. I have never stated anything on my own authority, but constantly courted and solicited inspection, inquiry, and publicity.

I could give a dozen other reports, from the *True Sun*, *Times*, *Chronicle*, &c. of journeys to different places, but I think those already given, especially in the Appendix, will suffice.

With such facts as the above staring them in the face, what can we think of the motives of those men who are egging on the public to expend millions upon millions of pounds sterling in the construction of railways upon such lines as that of Brighton, Windsor, Calais, &c. &c. The answer might prove offensive to many a worthy engineer, iron founder, or attorney, so I will leave others to give it for me, after they have well reflected upon the facts I have laid before them.

By-the-by, what are the proprietors of our numerous canals about? It has been proved to them, that *a properly constructed boat*, with sixty passengers, can be propelled at the rate of ten miles an hour, without causing so much surge as one of their common boats going at the rate of three miles, and still they do nothing towards the adoption of so vast an improvement.

The expenditure of SIXTY MILLIONS OF POUNDS STERLING, the destruction of 50,000 acres of valuable land, and the irreparable injury that will be inflicted upon the whole (to the total ruin of many) of the inland carrying establishments, whether by land or water, along the three thousand miles of projected Railway conveyance, are subjects of great national importance. *Sixty millions of money* employed

PROFITABLY, and especially when employed in co the vast, various, and incalculable social benefits of in cheap, and accelerated communications, would pr great mass of national prosperity. But the question THE SIXTY MILLIONS, EMPLOYED IN THE MANNER PE YIELD AN ADEQUATE PROFIT? If they will *not*, structions and establishments cannot, in the nature o be maintained, but must fall into disuse; and in th will involve another portion of society, far greater first above alluded to!

Those who are interested in this important subject make a point of reading the valuable work of Mr from which I have (with permission) made the p long extract. They will find much more valuable n fact, worthy of their serious consideration.

For me to make any general observations on th national importance of the substitution of elementary of horse power, would be superfluous; the opin demonstrations of such eminent men as Colonel T Mr. DAVIES GILBERT, Mr. ALEXANDER GORD FAREY, &c. are sufficiently set forth in the foregoing to excite serious reflection, and I should think, ent viction in the minds of the readers: with regard t unprejudiced and uninterested gentlemen have fi a most uncontrovertible series, in the accounts h published, of what they have witnessed of the perform a Steam Carriage on common roads.

FRANCIS MACERO

APPENDIX.



MACERONE

versus

MECHANICS' MAGAZINE.



"Quere peregrinum vicinia rauca reclamationat."

———— The crown replies,
Go seek a stranger to believe thy lies.

HOR. EP. XVII.

MACERONE

versus

MECHANICS' MAGAZINE.

THE editor of the *Mechanics' Magazine*, out of his own innate and spontaneous knowledge of all things, undertook, in No. 539, to write a long critique upon a Steam Carriage which he had never cared to see. My reply to that effusion appeared in No. 541, to which the editor appended a set of editorial notes. To such notes I thought it necessary to write a rejoinder, which the fair and veracious editor refused to admit, on the plea of its being of the unconscionable length of "thirteen pages!" This editorial shuffle again elicited from me a few lines of remarks, which were also refused insertion!

Holding it to be useful and proper to expose editorial unfairness and malignity, I have printed the whole correspondence, for the edification of the readers of the *Mechanics' Magazine*.

MACERONE AND SQUIRE'S STEAM CARRIAGE.

Mechanics' Magazine, No. 539, December 7, 1833.

We have two or three times incidentally noticed the performances of the Steam Carriage of Messrs. Macerone and Squire, but have not hitherto been in possession of the materials requisite

to do adequate justice to its merits. Indeed, we are even now but partially informed on several essential points; for all that we have before us is a lithographic plate, published by Mr. Tilt, from which the perspective view on the preceding page is copied by permission, and a Pamphlet by Colonel Macerone, which touches more on the general subject of Steam travelling on common roads—as, indeed, its title indicates*—than on the mechanical construction of the engine in which the author is immediately concerned. The inventors have obtained a patent for their boiler, but have still their specification to enrol, which is, doubtless, the reason of the existing paucity of information on the subject.

Colonel Macerone commences his Pamphlet with an historical review of the progress of Steam travelling on common roads, which is, we regret to say, far from being either correct or just. It opens with the following very startling passage:—

“Only a few years ago, many scientific papers appeared in the Public Journals of England, demonstrating, with *mathematical precision*, that it was ‘impossible for a Steam Carriage to propel itself along a horizontal line on a common road.’ These mistaken views, backed by a ‘mathematical’ (pretended) authority, have had considerable effect on the public mind; for many more persons have read such assertions than have had an opportunity of witnessing the *demonstration* of their fallacy.”

We have more than once met with representations of a similar kind to the preceding, but have never yet been able to trace them to any foundation in fact. We should like much to be able to refer to some two or three of the “many scientific papers” where the impossibility of travelling by Steam on a common road was demonstrated with such “*mathematical precision*.” We take it for granted, that Colonel Macerone has himself met with papers which seemed to warrant this description; but for our own parts we have not the faintest recollection of ever encountering any thing of the kind. We wish well to Steam Carriages, but not (if it can be avoided) to the dishonour of mathematics†.

* A Few Facts Concerning Elementary Locomotion. Put together by Francis Macerone.—Effingham Wilson. 1833.

† Do I not say “*pretended*” mathematical authority?—F. M.

Colonel Macerone gives a list of the different Steam Carriages which have been patented during the last eight years, and "been tried;" but which have, "one after the other, been more or less withdrawn from the field, or have expired a natural death." In this list we find the names of "Mr. W. Hancock," and "Messrs. Heaton, of Birmingham!" We think that common candour should have dictated the assignment of a very different place to these rival competitors at least. "More or less withdrawn from the field," is a phrase of very convenient pliability: but in no sense can it be fairly applied to either Mr. Hancock, or the Messrs. Heaton. If these gentlemen are not to be considered in the field, and with good chance of success too, we should be glad to know with whom Messrs. Macerone and Squire imagine they have to compete? Is it Sir Charles Dance? It would seem even so; for of Sir Charles's last appearance on the stage, Colonel Macerone remarks—"Sir Charles, however, has not lost courage; he has constructed a new Steam Coach, or rather drag, with which he has made several trials, *with more success than any of his predecessors!*" The deuce he has! Where, Colonel, be the proofs of this "*more success?*" Sir Charles went to Brighton—so did Mr. Hancock*; Sir Charles plied for two or three days between London and Greenwich—so did Mr. Hancock between London and Paddington, and for more weeks than Sir Charles could count days—Sir Charles tried to go to Birmingham, but stuck in the mud; and so did *not* Mr. Hancock. Compared with the Messrs. Heaton, Sir Charles's claims sink still lower in the scale. The Messrs. Heaton went six times in one day between Birmingham and Wolverhampton, a distance of thirteen miles, which is more than Sir Charles ever did—more than even Messrs. Macerone and Squire themselves have ever yet been able to accomplish †.

Of Sir Charles Dance's former achievements on the Gloucester and Cheltenham road,—with respect to which Sir Charles himself has always observed so suspicious a silence,—Colonel furnishes the following particulars. If correct (even

* In two days.—F. M.

† How do you know that?—F. M.

in the main), they remove all cause for wonder at the gallant Knight's taciturnity on this subject:—

“ In January 1831, Sir Charles Dance purchased three Steam Carriages of Mr. Gurney for 800*l.* each, all constructed and painted *so as to appear exactly similar the one to the other*. With these three carriages, Sir C. Dance commenced running for hire on the 21st February, 1831, between Cheltenham and Gloucester, a distance of nine miles, of beautiful and perfectly level road, for the most part on the border of a canal. The carriage frequently accomplished the journey of nine miles within the hour; but such was the frequency of breakages of machinery, and bursting of one or more of the tubes of the tubular boiler, that it required the utmost exertions of an engineer (Mr. Stone), at a salary of 1*l.* per day, and four men at 3*l.* per week, to keep one of the three coaches in moving order, *especially as it was thought necessary to make the public suppose that it was only one coach, and always the same coach, which performed the journey*. These carriages, however, certainly did run; and, considering their tubular boiler and machinery both complicated and imperfect, they ran so as most satisfactorily to resolve the problem of Steam Carriages travelling on common roads. It is true, there were no hills between Cheltenham and Gloucester; but Mr. Gurney had previously ascended with one of his carriages some of the steepest hills in the neighbourhood of London, than which there are few steeper on the ordinary turnpike roads in England. It may easily be supposed that, from the vast expenses incurred in this experiment, with an engineer and so many men constantly employed in repairs, it could not have been a *profitable* one. To add to the difficulties of the persevering and public-spirited Sir Charles Dance and Mr. Gurney, the many wealthy horse-coach proprietors, together with the narrow-minded country gentlemen and magistrates of the district, who conceived their interests threatened by the Substitution of Steam for horse power, formed together one of the most disgraceful and mean conspiracies against a national undertaking that can be well remembered. By means of parliamentary intrigue and false representations, these despicable persons obtained certain local turnpike bills to pass the “Honourable House,” establishing tolls on Steam Carriages, which amounted to a virtual prohibition of their use. For instance, 2*l.* were charged to a Steam Carriage, while only 2*s.* were exacted from a four-horse stage coach. In addition to this flagrant outrage against justice and utility, the worthy squires and magistrates of the Cheltenham district, suddenly, without any necessity, covered a long tract of the road with a layer of loose gravel, a foot deep, which, adding to the above-mentioned difficulties and impediments, put an entire stop to the undertaking.”—pp. 7, 8.

Colonel Macerone quotes, from the Report of the Parliamentary Committee on Steam Carriages, the passage in which

it is stated that "Mr. Hancock reckons that, with his carriage he could keep up a speed of ten miles an hour, without injury to the machine;" and subjoins the following note:—

"He has never gone faster than eight miles the hour, except down hill; and seldom been out without being brought home by horses."

To those who witnessed Mr. Hancock's daily performances, for several weeks, and for two or three times a day, between London and Paddington, this statement must seem very extraordinary*. We have understood that the carriage was brought home by horses, *once* (from the breaking of the axle)—but *once* only.

Mr. Ogle, it will be recollected, made all the world stare, by asserting that his "experimental Carriage went from London to Southampton, in some places at a velocity of from 32 to 35 miles an hour." Colonel Macerone's note on this statement is amusing, though after what we have seen of his inattention to accuracy, to be taken *cum grano salis* †.

"He took five or six days to perform the seventy-five miles. Last summer he was ten weeks going from Southampton to Liverpool, and sixteen days from Liverpool to London! Mr. BERRY, of Chancery Lane, Editor of *The Register of Arts*, accompanied Mr. OGLE's Carriage from Birmingham to Wolverhampton, a distance of 13 miles, which took 6½ hours to perform! Thirty miles an hour!! I have in my possession the newspapers which announced his departure from Southampton, and his arrival at different towns on his route to Liverpool; his arrival there, his departure from thence, and his arrival in London; but at this moment I cannot lay my hand upon them. I know many gentlemen who have travelled in his carriage, and I have travelled after it myself. To those who take an interest in elementary locomotion, and who must feel quite astounded and bewildered at the 35 miles an hour story, it may be interesting and instructive to peruse a letter written by a respectable and unprejudiced machinist residing at Hurley near Marlow, Bucks, to his son, in London, which I have now before me.

* False!—F. M.

† What gratuitous insolence and impertinence! "Inattention to accuracy!" Give the lie, fellow, not to me, but to Mr. Berry, and to Mr. Godfrey, if you must be so foul-mouthed! It is *their* authority I quote.—F.M.

" Hurley, Dec. 4th, 1832.

" DEAR ALFRED,

" We were apprized, at mid-day yesterday, that a Steam Coach was on its way to pass by our house. Of course we were all on the look out. For my part, I thought it the greatest treat I could have. When lo! about half-past two o'clock, a great unwieldy monster arrived, in a most terribly crippled state, and stopped at our shop to be repaired. They brought their own mechanics with them, so that I had no trouble with it. When done, they made a very bungling set out—stopping every twenty yards. I never was so disappointed in my life. They had on board, the master, who sat in front as steersman, and four engineers. They entirely emptied our well in filling their boiler; and we had forty men in the shop to witness the proceeding. You must think it was not very agreeable! They commenced their journey from Southampton to Liverpool, from thence to Birmingham, and so to London. The master's name was OGLE; they say a captain in the navy, a fine young man, * * * * * He set out on an experimental expedition, and would cost him, at least, £500. I am sure the situation of master and men was by no means enviable, and I really pitied them. I should think the Londoners would quite laugh at them. If this be a specimen of Steam Coaches, I have quite done with them. They only came from Dorchester, and, I believe, reached Salt-hill, about 28 miles, from morning to dark night! which I should have thought ought to have been done in two hours, at furthest. I have nothing more to write, except with kind love, &c. &c.

" J. GODFREY."—pp. 18, 19.

We come now to Messrs. Macerone and Squire's own Carriage, with respect to which we have the following statements:—

" *Subsequently, however, to the issuing of the above report, a Steam Carriage has been constructed by Mr. John Squire and myself, far superior to any that have preceded it. The boiler is of such a construction as to render injurious accidents impossible; and the machinery is of so compact and simple a nature, that the Carriage has actually run 1700 miles without a single shilling being required for repairs.*"—p. 27.

" The difficulty of constructing carriages capable of running on common roads is certainly very, very great; *it has, however, at length been achieved.* It is, on the other hand, comparatively easy to make such as will act well on a Rail Road. The disparity in the two cases is singularly exemplified in the fact, that not one of the locomotive engines which perform such 'wonders' on the Manchester Rail Road, can work even at the rate of a mile an hour on a common road; indeed it is doubted whether they will move at all. None of the celebrated engineers who have constructed them, have produced a boiler that can bear more than fifty or sixty pounds pressure to the square inch; while, to *duly* propel a carriage on a common road, a pressure of one

undred and fifty to two hundred pounds to the inch is indispensable. The silers, too, of the Rail Road Carriages are very far from being on a *principle* of safety. They are all recipients of great diameter, containing a great mass of water, strong merely by thickness of metal; but sure to commit sad havoc, should they happen to burst. On the other hand, the boiler patented last July by Mr. Squire and myself, as well as Mr. Gurney's, and some others, whose carriages *have not been so successful*, are constructed on a *principle* of separation and division, which render it *next* to impossible that an explosion should occur; and further, should such an explosion (or, rather, opening) take place, it absolutely *cannot* do any harm, save the stopping of the progress of the vehicle."

In addition to these statements, Colonel Macerone quotes, from the *Morning Chronicle*, an account of a journey which he made with his Carriage to Windsor, on the 8th of September last, in two hours and fifty-one minutes, stoppages included; and also other newspaper reports given of other excursions, performed with equal success, but of less extent. The substance of the *Morning Chronicle's* account of the Windsor trip we gave at the time (see *Mechanics' Magazine*, No. 527); and think sufficient justice will be done to the testimony of these broad sheet authorities, if we now quote what the same journal states with respect to one of these minor displays:—

"The Steam Carriage belonging to Mr. Squire and Colonel Macerone * * * started on Saturday from Paddington at half-past three o'clock, and ran down to Edgware, a distance of eight miles, as near as possible, from the point of starting, and returned to that point in one hour and fifty minutes; performing sixteen miles in that time, including stoppages. The Carriage stopped twice to take in water, which consumed a considerable time, much more than, under proper regulations, there will be any necessity for*. These two stoppages consumed about thirty-four minutes; so that the sixteen miles were actually passed over in seventy-six minutes, or at the rate of four minutes forty-five seconds per mile—being an average speed of fourteen miles an hour, exclusive of stoppages. Some single miles were passed over in three minutes and a half. Including stoppages, the speed was nearly nine miles an hour. With proper arrangements, these stoppages, for any length

* "When proper stations for coke and water are established on the roads, the water tanks or butts will be so placed as, by means of a leather hose, to fill the Steam Coach tank in the space of a minute. At present, having to do it with buckets, it causes the sad loss of time above complained of."

of time, may be avoided; and the speed with which the carriage can conveniently travel, including all stoppages, may safely be assumed at upwards of twelve miles an hour. On the Edgware Road, there are two smart hills, on one of which, called Red Hill, there was a complete layer of loose gravel; and up these hills the Steam Carriage went, with a considerable, but a diminished velocity—we should suppose at the rate of eight miles an hour. The trip was in all respects successful, and, the Carriage being as easily managed as a child's cart, the speed may be checked or continued at pleasure."

If we may believe implicitly all that is stated of Messrs. Macerone and Squire's Carriage in these extracts, it must be allowed to have eclipsed, in one important respect, all "that have preceded it." "Seventeen hundred miles without a single shilling being required for repairs!" That is far, far beyond what can be said of any other Steam Carriage that has yet appeared on the road, and if literally, or even but substantially true, it settles at once the only material question which remains undetermined with respect to the economy of Steam travelling, namely, the question of wear and tear. But what says belief? We are sorry to put the matter on this issue; but after the extraordinary latitude of assertion in which Colonel Macerone has indulged with respect to the plans and performances of others, he cannot be surprised, and ought not to be offended, that his representations of his own and his partner's doings are suspected of a similar taint. We must say frankly, that we do not believe the statement of the repairs that have been required *to be correct*. We have never heard of any carriage whatever, far less a Steam Carriage, that could travel seventeen hundred miles without wanting some repair or other. We do not impute to Colonel Macerone any design to deceive the public; but we suspect that he has himself been deceived by others (for Colonel Macerone is not, of course, the *working man* in the affair), and we blame him for a habit (but too apparent) of speaking at random, which has made him an apt instrument for the deceiving of others.

In one of the passages which we have just quoted from Colonel Macerone's pamphlet, he states that the boiler of the Carriage is so constructed as to render "injurious accidents *impossible*;"

but in another, this assertion is modified into the following:—
 “it is constructed on a principle of separation and division which render it *next* to impossible.” We have here another striking example of the author’s habitual inattention to the value of words.

Colonel Macerone asserts that “not one of the locomotive engines which perform such wonders on the Manchester Rail Road can work at the rate of a mile an hour on a common road—indeed, it is doubted whether they would move at all.” We should be glad to know on what authority Colonel Macerone makes this statement. Not on any authority, we are certain, that is worth a rush. But assuming it for a moment to be true, that not any of these locomotive engines which go at the rate of thirty miles an hour on a Railway, could go even at the rate of one mile an hour on a common road—that is, that thirty times more steam power is required on a common road than on a Railway—what are we to think of the consistency of Colonel Macerone, who maintains, notwithstanding (p. 17), that steam travelling on Railways is not at all to be compared, in point of economy or any thing else, with steam travelling on common roads?

The boilers of the locomotive engines on the Manchester Railway are represented by Colonel Macerone, as being “all recipients of great diameter, containing a great mass of water, strong merely by thickness of metal.” They are *notoriously* perfectly the reverse.

Notwithstanding the numerous exceptions we have been obliged to take to the statements in Colonel Macerone’s pamphlet, and the large allowances that seem requisite on the score of truth and probability, we see enough to justify us in coming to the conclusion that Messrs. Macerone and Squire have, in truth, produced a very capital machine, and one which might be safely left to bear the brunt of competition on its own unexaggerated merits.—ED. M. M.

Since writing the preceding notice, we have read in the *Morning Chronicle*, reports of two successful excursions made by Messrs. Macerone and Squire's Steam Carriage, to Harrow on the Hill. We subjoin an extract from the account of the first excursion:—

"The success of the Carriage being so complete on roads of ordinary difficulty, Colonel Macerone determined to take a trip to Harrow on the Hill, which is acknowledged to be one of the most rugged and difficult in the neighbourhood of the metropolis, and which has long been held out by scientific men as the criterion by which to judge of the strength and power of a Carriage of this kind * * * We started from Paddington at a quarter to three o'clock, and arrived at Harrow on the Hill (a distance of nine miles) in one hour and forty minutes. But of that period rather more than forty minutes were consumed in taking water, and trying an experiment with a new drag, so that the whole distance was completed in fifty-eight minutes, exclusive of stoppages*. The hill was ascended apparently with ease, at the rate of seven miles an hour, and during no part of the journey was the full power of the steam put on."—Ed. M. M.

H. to the Editor.

STEAM CARRIAGE EXPERIMENTERS.

Sir,—I am afraid the public have by this time become so suspicious on the subject of Steam Carriages, that Mr. Hancock's explanation of the causes for which "*The Autopsy*" has been (rather suddenly) taken off the road, will hardly prove quite satisfactory. If Mr. Hancock had previously intended to withdraw it for examination at the end of the third week of running, why, in the name of wonder, did he not give the public some intimation of the fact? This would have prevented a great deal of disappointment, and a great deal more of adverse rumour. Why, also, if Mr. Hancock was undetermined whether to commence again immediately, or not until next March, did he

* The moderated speed with which we travelled along the road to Harrow was adopted on account of the extreme narrowness and continual sharp turnings on that road, which is also thick set on both sides with dense hedges, so that one can hardly ever see clearly fifty yards a head. Our steam was blowing away all the time from the safety valve.—F. M.

exhibit, in the windows of his office, notifications that it would start again "*in a few days.*"

I have a closer question still to propose, which I hope will be answered explicitly and fully. Did, "*The Autopsy,*" or did it not, meet with some accident (on the Saturday on which it ceased running) a little on the Islington side of the canal bridge? It has been strongly reported that such is the fact, and I have even met with persons who asserted that they were eye-witnesses of it;—that something appeared to have occurred to the boiler, in consequence of which the passengers were so much alarmed that they quitted the Carriage in the utmost haste. *Is this true?* It certainly derives some little confirmation from the facts, that "*The Autopsy*" was on that day taken off the road *long before its usual time*, and that it has never appeared on it since.

There are one or two inaccuracies in the article of last number, on Macerone's Steam Carriage, which require correction, Mr. Hancock is several times alluded to, as having travelled daily for some weeks "*between London and Paddington.*" Now, his journeys extended only from Finsbury-square to Pentonville, or scarcely *one-third* the distance. (In the article accompanying the cut of "*The Autopsy,*" the distance is called "nearly two miles!" but it requires a little stretching, to make it a mile and a half). He is also said to have done this for more weeks than Sir C. Dance run days between Waterloo-bridge and Greenwich. Now, Sir Charles, I believe, did manage his journeys for *five* days together, while Mr. Hancock's trips lasted just *three* weeks, minus one day—or one day and a half. Colonel Macerone is hard enough on his competitors, but he forgets to inform us that, although "his Coach run for 1700 miles without a shilling being laid out in repairs," while "nobody was there to see," it broke down on *both* his "*triumphant*" *public* journeys—those to Windsor and to Harrow. How is this perversity to be accounted for, unless, indeed, we allow a Steam Coach to have some degree of mental capacity, and a considerable love of mischief!

I am, Sir, your's, respectfully,

H.

"H.'s" statement, that when Mr. Hancock made his two or three weeks' trial with the "*Enterprise*," he only went from Finsbury-square to Pentonville, instead of to Paddington, is assuredly incorrect. We met it ourselves, more than half a-dozen times, on the part of the New-road between Euston-square and Portland-place.

A correspondent informs us that a friend of his rode on Sir Charles Dance's Carriage to Clapham, on Wednesday last (4th December), and that they took full an hour in doing the five miles, which was attributed to a leakage in the boiler; and that, on the Thursday following, the machinery got so much out of order, that it was necessary to suspend operations entirely during the Friday, in order that the necessary repairs might be made*.—Ed. M. M.

REPLY OF COLONEL MACERONE TO THE EDITORIAL CRITICISM,
AND TO H.

Sir,—You begin your strictures on my pamphlet on Elementary Locomotion, in No. 539 of the *Mechanics' Magazine*, by saying you would like to refer to some of the scientific papers where the impossibility of travelling by steam on common roads was demonstrated with such mathematical precision. That about the year 1825 I did read several such statements, I very well remember, as will also, I dare say, many of our readers; but being at present at a distance from London, I cannot look into the works I should wish to consult. If you will, in the mean time, turn to your own pages, I think you will find that your talented correspondent, Saxula, especially in his earlier papers, assumes to *demonstrate* the *impossibility* of Steam Carriages on common roads being propelled up an incline with short leverage or cranks, such as Gurney's, Ogle's, our's, &c.

I am sorry that I should have been led into the error of including Messrs. Heaton's Carriage amongst those which "have been more or less withdrawn from the field." My informant was a gentleman and an engineer, who has frequently tarried at Birmingham, and has frequently witnessed the doings of Messrs.

* The "operations" were suspended altogether, and have not since been resumed.—F.M.

Heaton's machine, which I am glad to hear has been the many trips between Birmingham and Wolverhampton you speak of. It is a pity that this achievement should not have been rendered more public; it would have saved me the rap which you gave me on that point at least.

With respect to Sir C. Dance and Mr. Hancock, I will say no more at present, but leave them to the ultimate proofs of their own merits and demerits. I cannot duly reply to your observations on their doings and my sayings, without entering into such particulars and facts as would give offence, appear invidious, and, after all, do no good. It is not all the writing in the world that will make black white, or induce the public to adopt any other Steam Carriages but such as are really shown to possess those qualities which are indispensable to their successful substitution for horse-power. I think I have seen a deal more of the two last-mentioned Carriages than you have, Mr. Editor, and almost unavoidably, I may say, am periodically made acquainted with many things which are carefully kept from the public. Pray, *en passant*, will you tell me how many days following Mr. Hancock ran his Carriage "between London and Paddington" during all those weeks you speak of? And for how many days, and how many times a day, did he latterly perform his mile and a quarter journey between Finsbury and Pentonville? Pray how did Sir Charles run last Wednesday and Thursday to Clapham? He has not acquainted the public with the discontinuance of his plying, and he never takes with him any "broad sheet" reporter. How has he run since? How many times has Mr. Hancock's boiler burst? How many times Sir Charles's? How many times has—but this would lead me just where I do not wish any more to tread*.

* We do not think this mode of putting questions one of the most honourable that could be adopted of damning a rival's reputation, and, as the present case stands, we cannot help thinking that Col. M. makes a most unhandsome use of it. The particular assertion for which we took him to task was, that Mr. Hancock has "seldom been out without being brought home by means of horses." Now, instead of either justifying this assertion, or atoning for it, if erroneous (which it most unquestionably is), he says nothing at all about it, but takes leave of the subject with another Parthian volley against the reputation of the party he had injured!!!—ED. M. M.

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Ed.

to give an account, taken from the *Morning*
of a trip made by the reporter in our carriage
I wonder why you clipped off the first few
which, to the character of a Steam Carriage,
important. The report is—"The Steam Carriage
the Squire and Colonel Macerone, which we men-
ago as having been to Windsor and back, has
(of breaking the axle) repaired, with which
and has been, for some time, again running
and neighbouring roads. On Monday last it
a party down to Windsor, and, after they had dined
them safe back to town. Since Monday it has
and back every day, and we had on Saturday the
witnessing its performance. It started—"Here Sir,
the report, on "broad-sheet authority," as you call
people will think that while you were about it you might
have begun at the beginning*. By-the-by, I suppose
such reports "broad sheet authority" by way of a
because you hold that the watches of the "broad sheet"
are no real authority for admeasuring hours, minutes,
seconds, and that the wearers cannot see the mile-stones!
is the uninterested observation and testimony of the
"broad sheet" editors of the *Times*, *Morning Chronicle*, *True*
Observer, *Bell's Life in London*, *Englishman*, &c. &c.
these official reporters have rode on our carriage, full of passen-
day after day, week after week, in comparison with the
assertion and "belief" of the editor of the "narrow sheet"
Mechanics' Magazine, who has never cared even once to see the
thing upon which he ventures to speak so much "at random†!"

* The reason we omitted the preceding part was simply, that it referred to facts of which the writer could evidently only speak from hearsay. We quoted all that he appeared to have himself witnessed.—Ed. M. M.

† We had no intention of conveying any sneer by the use of the phrase "broad-sheet authorities," for which authorities we entertain all possible respect. Neither are we aware of having opposed any mere "belief" of our's to any positive testimony of their's. Colonel Macerone is not, we presume, prepared to cite the newspaper reporters as witnesses of his carriage having gone 1700 miles "without a single shilling being required for repairs!"—Ed. M. M.

We now come to an article of "belief," which is a very delicate matter. Lord Brougham—I mean Mr. Henry Brougham—whilom assured the doctors and the students of Glasgow University that belief is entirely and perfectly involuntary, and independent of the will; so I will not anathematize, or burn, or shoot you, Mr. Editor, for not *believing* that our carriage has run 1700 miles, and many more, without requiring repairs. But, Sir, extending towards you so much unorthodox tolerance and forbearance, I must say that I feel most acutely the situation in which you place me, on the horns of a dilemma, either to have been deceived myself in the matter of the derangement and repairs, or to have been made "an apt instrument for the deceiving of others." You, Sir, who are so stingy of your belief towards me—"whose name is Legion" in this case, as legions can testify to what I say—you, Sir, actually require me to believe that the carriage has been stopped on the road by some derangement, without my perceiving it! Something sometimes gave way, and of course stopped our progress; but I, like the hoodwinked Manchean knight mounted on his wooden horse, knew not that we were "brought to;" but was deceived "by others" into the "belief" that we were going it gallantly along! There is, you say it, more wonderful matter yet, which I must "believe," or be accounted "no true man." We have seen how derangements, burstings, breakings, consequently stoppings, may have taken place without my knowing it, or the "broad sheet" gentlemen knowing it, or the passengers dreaming of it! Good!—But, Sir, you further would "teach us to believe" that the *repairs* of the ~~fore-~~said invisible, unfelt, unknown accidents, breakings, and burstings, were also made unknown to me or to any one else, either to our scores of daily visitors, our workmen, or the "broad sheet" gentlemen! You mean, of course, that this work was done in the night. By whom, reader, do you suppose, infers the Editor? By the sage Merlin hight, by Aladdin of Bagdad, or by the Devil and Doctor Faustus? No gentle reader, by Mr. John Squire alone, says the Editor of the *Mechanics' Magazine**! Mr. John Squire has been in the habit of doing all this—and in one

* We never said any such thing.—ED. M. M.

night!—so that nothing should be known of it next morning. He took the carriage to pieces—took off the boiler (16 cwt.), lit the forge, blew the bellows, made the repairs, put the boiler on again—all single-handed, during a few dark hours stolen from the murky night! Why, without magic, Mr. Editor, and without “speaking at random,” ten men could hardly do so much in ten days! Alas! poor Macerone! day after day, week after week, did he go out on the Steam Carriage, always full of passengers, morning, noon, and night—never did it go out without him—yet could he not, with his eyes open, escape being deceived by others out of the evidence of his senses! But he’s no working man, quoth the Editor—*ergo*, a tree might be felled before his face without his perceiving it! But joking apart, Sir, and apart also the impossibility of your proposition, Mr. Squire is about the last man in the world who would attempt or wish to practise any deception with respect to his steam operations. To deceive the public can answer but a very trumpety, transient purpose, *as will soon be seen in other cases*; but the deception you predicate is *impossible* *.

I pray you, Mr. Editor, do not misquote your own quotation from my pamphlet. Any how, if you will misquote, you should do it more sily, and oblige the reader to discover the trick, if he suspect any, by referring to my pamphlet, not merely to your own preceding page!

You say, page 165, “In one of the passages which we have just quoted from Col. Macerone’s pamphlet, he states that the boiler of the carriage is so constructed as to render ‘*injurious* accident impossible;’ but in another, this assertion is modified into the following:—‘it is constructed on a principle of separation and division, which render it *next* to impossible.’ We have here another striking example of the author’s habitual inattention to the value of words.” Pray, Sir, why have you stopped short after

* In spite of all this very smart writing, we must still ask where is the proof that Messrs. Macerone and Squire’s carriage went 1700 miles without requiring a shilling in repairs? A line or two of plain matter of fact, on this point, would be of more avail than whole realms of such special pleading.—
Ed. M. M.

the words "next to impossible?" Does the phrase so terminate? There is not a stop or a pause, or even a comma, after the word "impossible," which might have misled you, had you been napping, or in your cups! But, Sir, the phrase is—"next to impossible that an explosion should occur; and further, should such explosion (or rather opening) take place, it absolutely *cannot* do any harm, save the stopping of the progress of the vehicle." (*Mechanics' Magazine*, page 164, col. 2.) Here it is plain, to every one who can read, that the words "*next* to impossible" apply not to the "*injurious* accidents," said to be "impossible" in the preceding quotation, but to the explosion or *uninjurious* "opening." Knowing you, Sir, to be a man of a candid and honourable mind, I cannot for a moment attribute so gross a misrepresentation, to any thing but inadvertency, and I have measured my manner of speech accordingly; I will only beg of you to take back and appropriate to yourself the reproach which you have founded on an error of your own concoction. "We have here another striking example of *the Editor's* habitual inattention to the value of words." Take this back, Sir: it suits you to a tittle, with the exception of the word "habitual," which goes so far beyond the precincts of the subject under discussion as to render your use of it improper, even had you been right in the particular case*.

You go on to rate me, Mr. Editor, for limiting the rate of the Rail Road engines at only one mile the hour on a common road. *Perhaps* I might as well have generously thrown in another mile or two, and so allowed them three, or so, for their common-road pace; especially as, in this instance, I have suffered myself to be somewhat led (or, misled, if you will) by "authority," which is not one of my "habitual" failings. But if you will turn to the pages of your own excellent and unique Magazine, Nos. 449, 450, or thereabouts, you will find that several of the engineers and "scientific gentlemen" who were examined before the com-

* We gave both passages entire, that our readers might judge for themselves, and could not, therefore, have had any intention of misleading them. Neither do we see how Colonel Macerone's explanation removes the *still* manifest inconsistency between them.—Ed. M. M.

mittee of the House of Commons on Steam Carriages, state what you above object to. Moreover, I believe it may be proved beyond contradiction, that, *cæteris paribus*, according to the goodness of the common gravel level road, it will take from twenty to twenty-five times more power to propel a carriage thereon, than is required for a carriage of the same weight on a level railway. If, therefore, you will allow me to add one or two miles to the one only granted by the aforesaid engineers and "scientific gentlemen," who must have seen the thing tried, which I have not, I think it will be very handsome. I only venture to add one or two miles to the estimate of the engineers, upon the strength of your exclaiming that their authority "is not worth a rush*."

Now, out of this other mare's nest which you have had the luck to find, you draw another batch of addled matter, and soil the hand that was in such reckless haste to grasp it. According to Macerone, you exclaim, "thirty times more steam power is required on a common road than on a railway. What are we to think of the consistency of Colonel Macerone, who maintains notwithstanding (page 17), that steam travelling on Rail Ways is not at all to be compared, in point of economy or anything else, with steam travelling on common roads." Pray, Mr. Editor, will you lend me your spectacles,—your editorial ones, I mean,—your editorial glasses I want,—glasses that enable you to see that which existeth not, and not to see the half of a phrase which doth exist! I want them to find what you say I say (page 17). I cannot find it there, or in any other page of my pamphlet. I cannot find that I say any such thing. However, to be generous with you, I will allow that I may be said to *infer* as much in what I state, page 38 to 45, especially on my proposal to lay double lines of long stone blocks all along and flush with the existing surface of the present high roads, for the use of Steam Carriages. However, as a further mark of my respect,

* The readiness which Colonel Macerone here evinces to substitute *two for one*, furnishes as strong a proof as we could have desired, of the justness of our general conviction of his "habitual inattention to the value of words." he would but consent to our taking all his statements of matters of fact at the same rate of discount, there would probably be an end to all controversy between us.—ED. M. M.

Mr. Editor, I will not except to your quotation from "page 17," but, for the honour of your firm, accept your bill (of indictment), and forthwith now and here declare and maintain, that steam travelling on common roads, will generally prove far more economical, and nearly, if not quite, as expeditious, and quite as safe, as that on Rail Roads. Further, that common road Steam Carriages will shortly cause many of the Rail Road bubbles to burst ere they can be puffed into maturity, and ultimately drive the Rail-Roaders off their slippery perch, and make old iron cheap! Do you know that the Manchester and Liverpool Rail Road has already cost above 40,000*l.* a mile, and is not yet completed? What travelling and traffic will pay anything like the mere interest of the outlay of, at least, 2,080,000*l.* for a Rail Way from London to Brighton! A work is now in the press which will clearly *prove* that (barring heavy goods) capital employed in horse-coach travelling gives a far greater profit than that department of the Manchester and Liverpool Rail Road. And where, in England, in Europe, or in the world, will you point out another line possessing such advantages for a Rail Way! So much for "the inconsistency of Colonel Macerone *!"

But let us get on with your criticism: you go on to say, most consistent critic, "the boilers of the locomotive engines on the Manchester Rail Way are represented by Colonel Macerone as being all recipients of great diameter, containing a great mass of water, strong merely by thickness of metal; they are notoriously the reverse." Indeed, Sir! I ask your pardon for being so rude—but I must say, they are "notoriously" just as I describe them! As notoriously so as the specifications, published descriptions, and drawings of them, now before me, can possibly make them. Mr. Stephenson's boiler is all one "recipient," or cylinder, six feet long and three feet in diameter, containing, all in one mass, about sixty gallons of water. You surely will

* We quoted a wrong page of Colonel Macerone's pamphlet (we rather suspect, through an error of the press), for his opinions on this point; but it is very clear we did not misrepresent the general tenor of them. Our impression of his inconsistency on this point remains, therefore, as it was.—
Ed. M. M.

say that the twenty-five, or more, copper pipes which carry the heated *air* from the furnace through this mass of water, constitute any division or separation of the water and steam. Braithwaite and Ericson's boiler is similarly constructed, except that the heated air from the fire, instead of passing through twenty-five pipes, is conducted through one long tapering zig-zag flue. But here also the water is all in one recipient; besides which, the danger is further increased by the upright portion of the boiler, which contains the steam, being of great capacity, and of greater diameter than the rest. The same description applies to the boilers of Mr. Blenkinsop and of Mr. Hackworth, five feet in diameter, and which are, in fact, as well as the others spoken of, nothing more nor less than modifications of the common high pressure "long boilers" with the traversing flue, originated by Oliver Evans. Look to these things, Mr. Editor, and then take back, with interest, your "notoriously perfectly the reverse" imputation of my "speaking at random" and "habitual inattention to the value of words*."

You conclude your extraordinary production by saying, that "notwithstanding the large allowances that seem requisite on the score of truth and probability, we see enough to justify us in coming to the conclusion that Messrs. Macerone and Squire have in truth produced a very capital machine, and one which might be safely left to bear the brunt of competition on its own unexaggerated merits." I must leave you to settle the matter of the *lie*, which is here so delicately given, with the "broad sheet" gentlemen,—for they alone are accountable for the going of their watches, and counting the milestones. They alone have given to the public the statements which you stigmatize†. On the matter of derangements and repairs, I have

* We cannot take back our words, for, as applied, they were words of truth. The "boilers of the locomotive engines on the Manchester railway" are *not* "recipients of great diameter," in the ordinary acceptance of these words; and Colonel Macerone's explanation of them is, to our minds, a mere after-thought exercise of ingenuity.—ED. M. M.

† We must again, in all humility, beg leave to ask *where* these "official reporters" have borne testimony to Messrs. Macerone and Squire's carriage gone 1700 miles without requiring a shilling for repairs—which, be

said enough above ; there you may rest satisfied in your disbelief—it will neither burst our boiler, nor break a bolt. You have been repeatedly invited to honour us with your company, and been informed that the carriage would go out every day at three o'clock for the ensuing week ; but you never came. You have gone the true orthodox way to work,—refused investigation, and declined to see the thing you criticise. That was your own affair ; but being so, your concluding note of approbation is as unimportant as your censure is in *this particular case* *.

Should you like to see an account of one of our journeys, which is not "broad sheet" authority, you may refer to the recently published number of *Turner's Annual Tour* for 1834, wherein you will find (page 177) a description by Mr. Leitch Ritchie of his ride to Watford in our Steam Carriage. He makes some little mistakes about the smoke and the wheels, and he drags in Sir Charles *à propos de bottes*, merely on the strength of having *heard* of him, and of having been informed by the people of Bushy that Sir Charles had been there with his Steam Carriage some weeks previous, and had been drawn up the hills by horses. What a thing it is to have a "seat" in this land of "seats" and "chairs" and "benches !" To the possession of a "seat," even on "Clay Hill," Mr. Leitch Ritchie decrees renown and glory from generation to generation, *ad secula seculorum* !

This letter has grown to an inconvenient length ; but to take

it remembered, is the most material part of Colonel Macerone's statements that we have called in question.—ED. M. M.

* The fact of our having been "repeatedly invited" to witness the exhibition of Messrs. Squire and Macerone's Carriage, and that other singular fact of Colonel Macerone being at the trouble to send us this long letter of vindication, are plain proofs that our "concluding note of approbation is *as unimportant* as our censure !" We wonder how the case would have stood, had we said that Messrs. Macerone and Squire's Steam Carriage was the best of all Steam Carriages, and that all which Colonel Macerone has asserted of his rivals was literally true. Doubtless, we should have been the best of all possible public instructors—the only veritable scientific authorities.—ED. M. M.

to pieces and expose the errors of such a long tissue of sophistry and misrepresentation as you have produced in No. 539 of the *Mechanics' Magazine* cannot be done in a page or two, even in the cursory manner to which I have been necessarily obliged to confine myself*.

I make no doubt, Sir, but that you will feel the necessity and justice of giving insertion to this letter, without mutilation; and I have the honour to be, &c.

FRANCIS MACERONE.

London, December 11, 1832.

P.S.—It so happened, that I only received the Number, 539, in question this afternoon.

REPLY BY COLONEL MACERONE TO H.

Sir,—I crave your permission to address a few words to your correspondent H., who (in No. 540 of your valuable Miscellany) says, "Colonel Macerone forgets to inform us, that although his coach has run 1700 miles without a shilling being laid out in repairs, while no body was there to see, it broke down on *both* his triumphant *public* journeys—those to Windsor and to Harrow. How is this perversity to be accounted for?" &c. It is to be accounted for, good Mr. H., by my telling you that it is non-existent, and of your own invention! It is false, that we ever did break down, or break any thing at all, either going to or returning from Harrow. The *Morning Chronicle* of the 15th of last October, contains an account of our having suddenly sunk into a trap-like trench, three feet deep, filled with loose gravel, by the road side; but notwithstanding that both our near wheels sunk, literally up to the naves, through the assistance of a number of men with spades, and four stout horses, the carriage was dug out and dragged out, and pursued its way to town by Steam, without the slightest injury.

* Colonel Macerone is very discreet! He cannot *surely* have worse proofs to adduce of our "sophistry and misrepresentation" than those which form the burthen of this his *EXTEMPORE* epistle, and which we have so easily disposed of. If he has, let him bring them forward—we desire no forbearance, and spurn with disdain the supposition of our being *obliged* by the slightest suppression of the honest truth.—ED. M. M.

You may have learnt from the reports of the *Morning Chronicle* of the 9th of September, that, on returning from Windsor, on the 8th, an axle did break at this side of Hammersmith; but that journey was neither more nor less "*public*" or "*triumphant*" than any other of the daily ones we have made for weeks and months consecutively—not on roads like billiard-tables, but to Edgware, Stanmore, Windsor, Watford, Harrow, &c., on many of which we were accompanied by reporters sent purposely by the editors of many different papers, and our carriage always full of such gentlemen and ladies as chose to favour us with their company. Which of these scores and scores of journeys was more "*public*" than any of the others, H. ought to explain—none were ever proclaimed as such.

For further information on a subject on which H. is either really or affectedly in total ignorance, and presumes to write such flippant falsehoods, I beg to refer him to a letter of mine, which I have a right to expect will appear in No. 541 of the *Mechanics' Magazine*.

I beg you, Sir, to pardon this further intrusion on your valuable space, in consideration that—

"To hear an open slander is a curse:

But not to find an answer is a worse."

I have the honour to be, &c.

FRANCIS MACERONE.

London, December, 15, 1833.

On the 24th of December I addressed a reply or rejoinder to the foregoing notes of the editor, to which he refused insertion, on the following wretched and fraudulent plea:—

INTERIM NOTICES.

"We could not, without great injustice to many far better claims on our columns, give insertion to Colonel Macerone's thirteen pages (!) of 'rejoinder.' He has already occupied, in the defence of his steam-carriage sayings and doings, more space than he has made a good use of. It must suffice to state, that he again proves to his own entire satisfaction that we have used him 'most ungenteelly;' but produces no new fact in support of his many questionable statements, or in refutation of our criticisms upon them. When he has any tangible evidence to offer of Messrs. Squire and Macerone's carriage having gone 1700 miles without requiring a shilling for repairs, or of Mr. Hancock's having 'seldom gone out without requiring to be brought home by horses,' we shall, of course, insert it."

To this "Interim Notice" I immediately sent the following reply, which was also refused insertion!

TO THE EDITOR OF THE MECHANICS' MAGAZINE.

SIR,—I see by your yesterday's Number, that you refuse insertion to my last communication, under the pretence that you "could not," without great injustice to many far better claims on your columns, give insertion to Colonel Macerone's *thirteen* pages (!) of "rejoinder." Go it, Mr. Editor! There's no knowing all a man's qualities till you draw him out!—Why!—you are as clever and as bold at amplification, as you are at curtailment and mystification! To serve your purpose, and transmogrify my meaning, the other day you chopped a phrase of mine in twain, without looking for a joint, or any thing!—and now you make "thirteen pages" out of thirteen quarter sheets of foolscap paper, written very widely, only on one side, all which will go into one page and a half, or at most, two, of your Magazine*! Blessings on you, Mr. Editor,—you beat old Falstaff hollow! Thirteen pages in "buckram suits," out of my tiny bits of "foolscap!" But you are so devilish clever, I know you'll not cry craven, even here! You'll swear, 'pon honour, you did not mean "thirteen" *printed* pages, but thirteen foolscap pages. And were they not foolscap pages, seeing it was foolscap paper? Are not polypi chopped up to mince-meat, still veritable perfect polypi? But I feel sick of the thing—and so, I dare say, do your readers, and even yourself, though you've got a good stomach;—but I must proceed, with as few words as possible, to request that if you continue in your intention of excluding my "rejoinder" from your next number, you will be so good as to return it me by post, or leave it out for me at your office; for it is a pity that I should have had the trouble of writing "thirteen pages" for nothing! By-the-by do you know any one of your readers who did not understand you to mean "thirteen" *printed* pages? Show him up! Show him up!!

For the last twelve or thirteen days we have been running our Steam-Carriage every day, in various directions. Ever since

* It had it printed in the same way as the *Mechanics' Magazine* by the printer, and it makes two pages and one-fifth.—F. M.

Tuesday we have gone regularly to Edgware, from the Castle Inn, at the corner of Castle-street, Regent-street, Oxford-street,—of which regular running I have given public notice in the newspapers, both morning and evening. We have chosen the road to Edgware, because I defy any body to find a worse one out of London, either in respect to new gravel, softness, and hills. If you wish to see *three miles run in less than ten minutes*, and four miles, including the Windmill and other hills, and all new gravelled, done in nineteen minutes, which we did yesterday, and the day before that, and the day before that, and the day before that, and many times before this *winter*, you shall be furnished with a seat in our carriage any day this week, at eleven o'clock. N.B.—My compliments to those of your correspondents who talk so sapiently of things they have never seen, and invite them to come and see also.

I have the honour to be,

Your obedient, humble Servant,

FRANCIS MACERONE.

London, Sunday, 5th January, 1834.

P.S.—As it puts us to great inconvenience to employ ourselves and our men in running about with the carriage, I do not think that we shall continue our *regular* going after next Saturday. Our object has been gained, by those who have gone some scores of journeys with us being perfectly satisfied.

We are building some carriages to carry fourteen passengers and their luggage.

I shall not condescend to say another word to your correspondent H.

Upon this the Editor returned me my "*rejoinder of thirteen pages*," which is as follows:—

TO THE EDITOR OF THE MECHANICS' MAGAZINE.

Sir,—I crave your pardon, but may I say just two or three words in reply; or in rejoinder, as the lawyers have it? I want only to make a remark or two on your notes upon my letter in the last number of the *Mechanics' Magazine*. Page 201, note 1*, you say, "we do not like this mode of putting questions," &c. I should not have troubled myself, either to have made a single assertion, or asked a single question about the doings of

Mr. Hancock or Sir C. Dance, had you not, apparently with careful purpose and design, avoided to mention the performances and existence of the carriage patented by Mr. Squire and myself, while the daily papers were continually giving editorial reports of our performances on such roads as those of Harrow, Stanmore, Edgware, and Watford, while all that you heard of the others consisted in "advertisements," "communications from correspondents," and similar interested garbled accounts and puffings. Sir Charles Dance has publicly and pompously announced in the papers, the commencements of his runnings, &c., but has always left us quite unacquainted with his falling off from his performances, in consequence of the speedy falling to pieces of his machine! You know, Mr. Editor, that "comparisons are odious;" had you not have made so many absurd ones, I should have asked no questions. If I had, instead of asking questions, asserted facts, you would have asked for judicial proof of such facts, which would be very inconvenient to give, and "much ado about nothing." However, you will soon have proof enough of all that I have advanced, if you will but live a few weeks longer. You are not the man to cut your throat for shame.

In reply to note 2*, page 202, I beg you to reflect, that such respectable men as the reporters of the *Chronicle*, *Times*, *Truth*, *Sun*, and *Observer*, who so frequently favoured us with their company, were not likely to state that which you, in strictness, have a right to call "hearsay," without good reason to believe it correct.

In note 3†, page 202, you say, Colonel Macerone is not, would presume, prepared to cite the newspaper reporters as witnesses of his carriage having gone 1700 miles without repairs, &c. The reporter of the *Morning Chronicle* does advance as much in the paper of the 15th or 16th of last October. This, you will say, is mere assertion; but he must have had good reason for believing what he stated! Had you, Mr. Editor, seen as much, as much would you have believed; but you have refused to see at all!

Note 4*, same page, I leave to the disposal of your astonished readers. By whom, then, do you infer that the repairs were made?

Note 5*, page 203, you ask for "matter of fact" proof of the

1700 miles travelling without repair. It is very plain that the only "proof" at which you could not cavel, would be for you yourself, Sir, to ride in the carriage the 1700, or more miles, without losing sight of it a moment, except when you had secured it for the night, under one of Bramah's best patent locks, the key of which should never be an instant out of your possession! I SAY THAT OUR CARRIAGE HAS NEVER BEEN STOPPED ON THE ROAD THROUGH ANY DERANGEMENT (SAVE THE BREAKING OF THE AXLE). IT IS FOR YOU TO PROVE THAT IT HAS. I AM NOT TO PROVE THE NEGATIVE, ALTHOUGH I COULD, AS FAR AS OATHS AND AFFIDAVITS GO. WHO EVER SAW ANY THING HAPPEN TO IT? Note 6†, page 203, on the matter of your misquotation of a phrase of mine, you say, "we gave both passages entire, that our readers might judge for themselves, and could not, *therefore*, have had any intention of misleading them. Neither do we see how Colonel Macerone's explanation removes the *still* manifest inconsistency between them." This is quite astounding! What to call it I don't know, without being unpolite, which I can't abide! Instead of acknowledging your error, saying it was a mistake, or saying nothing at all, you hold up your head, and reiterate your proposition that the half is equal to the whole!—that that "that" that follows the words "next to impossible," is not indicative of something further coming, which, however, you did not choose to take into account. It is true, as you plead, that you "gave both passages entire;" but then, in the next page, you cut one of them in two, without even looking for a joint, or nick, or crack, but just where it suited you, to foist upon the fragment a meaning unexisting in the whole!

It is hard for me to be obliged to repeat and to re-write phrases, and hard upon you to have to reprint them; with your readers it is optional whether they choose to read them or not; but you are so obstinate, what can I do? Why, I must take the two phrases, which you say are so manifestly dissimilar and inconsistent in their meaning, and lay them cheek by jowl, that your readers may compare them. Look at them, gentle reader, and if thou hast attained thy seventh year of age, I will abide by thy decision. Paragraph 1 is, "The boiler is of such a construction

as to render *injurious* accidents impossible." Paragraph 2 is, "constructed on a principle of separation and division, which render it next to impossible that an explosion should occur; and further, should such an explosion (or rather opening) take place, it absolutely *cannot do any harm*, save the stopping of the progress of the vehicle." Now, my little gentleman or lady reader, it must be very plain to you, that for our naughty editor to cut this last phrase short off after the words "next to impossible," where I have made a straight stroke (not a pot-hook, my dear), deprives the said "next to impossible" of any reference or sense whatever! Next to impossible—what? why, you see, the phrase goes on "that an explosion," &c., perfectly in accordance and confirmatory of the meaning of phrase No. 1, which precedes No. 2 in my pamphlet by ten pages. You see, my dear little reader, here are the two paragraphs complete, in the editor's own article (page 164); no wonder that you are astonished at his—what shall we call it—blunder, and still more so at his obstinacy in adhering to it! Well, we will say no more about it; perhaps, he is only joking after all; for surely he must suppose that his readers can read, aye, and understand too, such a case as this; even those beneath their teens!

Your note 7, page 204, runs—"the readiness which Colonel Macerone here evinces to substitute *two* for *one*, furnishes as strong a proof as we could have desired of the justness of our general conviction of his "habitual inattention to the value of words," &c. I am sorry to say that this note is also written either in a spirit of bad faith and misrepresentation, or else from an "habitual inattention to the value of words." I clearly show, in the very paragraph to which this note is appended, that my authority for the *one* mile an hour pace of Rail Road engines on a common road, was derived from the declarations of the engineers and "scientific gentlemen," who were examined before the Committee of the House of Commons, on Steam Carriages, and I referred you to "No. 449, or 450, or thereabouts," of your own Magazine. May not I, therefore, consent to substitute *two*, or even *three*, for the *one* of the aforesaid engineers, without deserving your reiterated charge of "*habitual* inattention to

the value of words!" By-the-by, *your* use of the words "*habitual inattention*"—"habit of speaking at random," &c., while criticising a particular proposition of mine, and that only, seems to me exceedingly sweeping, and a great abuse of the use of words, on your own part, Mr. Editor!

In note 8, page 204, you say that your impression of my inconsistency "remains as it was." Now this "inconsistency" consists in my inferring that steam travelling on *common roads*, will give more profit to the proprietors and shareholders, than it will on Rail Roads, the first outlay of which is at least 40,000*l.* a mile. Why do you not controvert *this* position, without slipping out with a mere echo of the imputation which I have disproved, or which is disproved by the tacit admission that my proposition is correct!

Note 9, page 205, would be quite amusing, if it were nothing worse; you say "we cannot take back our words, for as applied, they were words of truth. The boilers of the locomotive engines, on the Manchester Rail Way, are *not* recipients of great diameter, *in the ordinary acceptation of the words*, and Colonel Macerone's explanation of them is, to our minds, a mere afterthought exercise of ingenuity." Bravo, Mr. Editor, what a mind you have! you beat old Proteus hollow! there's no holding you to anything! You are in truth "the slippery god" with a vengeance! The boilers of the Rail Way engines are *not* large boilers or recipients of great diameter, "in the ordinary acceptation of these words," because (you mean) they are not so large as the 200 horse-power *saucepan* boilers of the low pressure engines employed in our mines and steam vessels—boilers as big as a large-sized drawing room! But, good Mr. Editor, is not the water and the steam in these Rail Road engines contained *all in one mass*? Is not this mass six or eight feet, by three or five, for what they call a ten or sixteen horse power? Is it not all in one mass, be it small, or be it large—that is the question! and that is the way in which I put it! The Editor might say a half-horse power low pressure boiler (even) would not be of great diameter (not so big as a house); therefore, it is *not* a "recipient of great

diameter in the ordinary acceptation of these words!" With regard to my "afterthought exercise of ingenuity," I cannot trust myself to say what I think of such a miserable shuffling critical shift.

For an answer to note 10, page 205, I must, for the sake of brevity, refer your readers to what I have said on notes 3 and 5.

Note 11, same page as above, is "the unkindest cut of all!" I had thought to pay you a just compliment—or rather to pay my humble homage to your merit—by inferring, as clearly as I knew how to express it, that I did not value your praise or your censure in this case, *because you had not seen*, but that *had* you condescended to see and to examine, there exists no man in the world whose good opinion I should be more proud of deserving, either in regard to what I am, or what I do! By "in this particular case," I mean *this* case, in which you cannot be a competent judge, *in consequence of the alibi*.

Note 12 and last, is a fine sample of what I call, in my *Ars Logica Copleiana*, the "*Argumentum Higgledipiggledianum*."—"Very discreet"—"extempore epistle"—"easily disposed of"—"spurn with disdain"—"honest truth," &c. What can all this mean? What have I done? "*Quid miser agi?*" Why, God bless you, reader! Colonel Macerone says that he has been obliged to reply to the Editor "in a cursory manner!" which means brief—and picking out a bit to reply to briefly—here and there, out of a long rigmarole; and this has put this Editor into such a taking, and made him talk of "spurn," and "disdain," and "honest truth," of which, in "*this particular case*," he seems to have cared so very little. As to the sneer about my "*extempore epistle*," I do not understand it! How many minutes per page do you allow, Mr. Editor? This "epistle" you speak of I am sorry to say, I wrote on a Monday, from notes I had taken in pencil on the previous Wednesday. Monday is not, neither is Wednesday, a *dies non*, or a *dies infaustus*; so I hope there is no harm in that! The next letter I write you, shall be knocked off on any day of the week you think of preferable augury, and

in any number of hours or minutes you will be pleased to assign, with due regard to the quantity of matter to be answered. Meantime, I have the honour to be,

SIR,

Your obedient humble Servant,

FRANCIS MACERONE.

London, December 24, 1833.

Wednesday, January 8, 1834.

TO THE EDITOR OF THE MECHANICS' MAGAZINE.

Sir,—I beg to inform your readers, that the "rejoinder" to your notes on my letter in No. 541, and which in the "Interim Notices" of your last number (543) you reject, *for want of room, being "thirteen pages" long*, may be had (the whole "thirteen" of them) gratis, by applying to their newsmen.

I also take this opportunity of reminding you, Sir, and your friends the H's and X's, and P's and Q's, the Juniuses and Solomons, &c. that our Steam Coach has now run consecutively for two weeks; the last eight days from the corner of Regent Street, Oxford Street, at eleven o'clock, to Edgware and back, a total distance for us, of nearly twenty miles. To believe the state of the road to Edgware, it must be seen. All the stage coachmen tell me it is the worst bit of road in England. However, our speed is from ten to twenty miles the hour, some miles being done in six minutes—that including the Windmill Hill for instance, and as many as three miles following, being done in three minutes each.

Let those who do not believe, come and see.

To-morrow we begin to run daily to Uxbridge, at the same hour.

Your obedient Servant,

FRANCIS MACERONE.

Instead of doing the justice to himself, to his readers, and to me, of inserting the above letter and announcement, this candid, just, and honourable critic, sneaks off with the following contemptible reiteration, and impertinent coward-fronted balderdash:—

NOTES AND NOTICES.

“Colonel Macerone has invited us, and requests us to invite also ‘the’ of our correspondents who talk so sapiently of things they have never seen, to repair to the Edgware Road, any forenoon after eleven o’clock, where shall see his Carriage doing ‘three miles in less than ten minutes,’ on the very worst road out of London, ‘whether as respects new gravel, softness, or hills.’ Next to the Editor, the Colonel seems particularly anxious for the presence of our incredulous correspondent H., on whom he is resolved to waste no more mere words. For ourselves, we don’t think it worth while to accept of the Colonel’s invitation: because, anything we could witness of a ‘fine morning’ would fall so far short of the Colonel’s previous performance of ‘seventeen hundred miles, without a shilling being required for repairs,’ as not to be worth, in comparison, the weight of a feather. And, on the part of ‘H.,’ we are desired to say, that though he has but little time, and less cash to spare, he will pay fifty guineas for a seat in the Colonel’s drag, any forenoon that the Colonel can procure, at the same time, the attendance of the four reporters of the *Morning Chronicle*, *Observer*, *Bell’s Life in London*, and *Englishman*, of whose unanimous reports in his favour he has boasted so often, and so largely: provided always, that the *four* shall not, by any sort of *hocus-pocus*, be personated by but *one* individual.

“‘Truth,’ who has sent us an account of the stoppage, for about an hour, of Messrs. Squire and Macerone’s Carriage, “on Thursday morning, the 26th December, near Gloucester Place, New Road,” through the breaking (it was said) of ‘one of the main-rods of the machinery;’ and of its having again stopped, on the same day, after proceeding about fifty yards from home, ‘with a noise as if the machinery were knocking itself about,’ when it was ‘backed into the yard,’ from which it did not emerge again till the Saturday (the interval of Friday being required for repairs, &c.), must assuredly be romancing. Colonel Macerone has himself reported to us, very regularly, what he has been doing since Christmas-Day, and he has never mentioned anything of the kind.”—*M. M.*, No. 544, page 256.

TO THE EDITOR OF THE MECHANICS' MAGAZINE.

Sir,—To the very apposite, candid, comprehensive, and sensible reply, which, in No. 544, p. 256, under the head of "Notes and Notices," you make to my letter of the 8th instant (not inserted), in worthy fellowship with your correspondent H. I beg to state in reply, that *You, H., and Co.*, shall soon have an opportunity of *seeing*, that the writers of the "broad sheet puffs" in the *four* journals which *You, H., and Co.*, falsely say I "have boasted of so often and so largely," shall not "by any sort of hocus-pocus be personated by *one* individual." At present I can produce you *three* such "puffers" connected with the "four" papers, to wit, Mr. Dowling, Mr. Hodgkin, Mr. Frazer; and Mr. Hodskin (now Editor of the *Courier*), once brought, some months ago, another of his colleagues with him, whose name I do not remember, but may soon learn. With this other I can produce an entire "puffer" for each of the *four* "broad sheets." Any how, there are *three*, so "that the *four* shall not, by any sort of hocus-pocus, be personated by but *one* individual."

As soon as I can manage to suit the above gentlemen's convenience, so as to get them to fix a day to take a ride together in the Steam Carriage, I will duly apprise *You, H., and Co.* thereof, in order that your friend H. may attend with his bag of "fifty guineas," and his nose well greased, to prevent its being caught hold of by —, not by the "broad sheet puffing" liars, as you both call them, but by keen, grinding, "puffing," old "rude Boreas," while running against him at twenty miles the hour.

In consideration also, of the rule that "the more the merrier," I will endeavour to get the company of Mr. Sheridan, and another "puffer," whose name I don't remember, who have, on three different occasions, been deputed by the Editor of the *Times*, to furnish "broad sheet authority," for the "puffs" he has imposed on the public, for veritable accounts of what his deputies did actually see performed by our Steam Carriage. I shall also

invite Mr. Courtenay, Mr. Snow, and Mr. ———, “puffer” of the *True Sun*; Mr. Temple Wright, of the *Morning Post*; and Mr. Leitch Ritchie, the writer of *Turner’s Annual Tour*. Lastly, I will request your friend, and especial protégé, Mr. Walter Hancock, to get him another cab, with the best horse he can find, and gallop after us to Edgware; and if, on our return, we should find him, with his horse, completely knocked up, we will take *him up* in our Carriage, as exactly occurred to him on the 2nd of this month.

With regard to H.’s “fifty guineas,” I certainly should not, under any circumstances, expect to see the colour of one of them! The impudent garbling—the begging and shirking of the question—the falsification and bad faith exhibited by that worthy correspondent of your’s, would, no doubt, be all applied to the purpose of sneaking out of his engagement of the “fifty guineas,” even were I to produce four, instead of three, reporters against the *one upon which he sets his stake!* You also, Mr. Editor, would surely, if consistent, give your mate a lift against me by cutting in twain *his* phrase of challenge after the word “largely,” and then maintain with open front, as in *my* case you have done before, that there’s no harm in that, because, it is only the *latter half* which you cut off, both from Mr. H.’s phrase and mine; which latter half is only an appendage, or, as it were, a tail, in which the vital principle, or sense, doth not exist! Isn’t it so, Mr. Editor? You’ll try it, I dare say, or some other shuffle, just as worthy of your recent exhibition. Take courage, you have shown yourself within these three weeks a very man of metal. H. will feel much obliged, and pay you salvage on the “fifty guineas.” He’ll give you gold for your brass! You can spare that now, for surely have you, within these few weeks past, built up unto yourself a splendid “*monumentum ære perennius*”—a record of your logic, candour, and veracity! However, this will do for the present; only, I must not forget to tell you that your correspondent “Truth,” whose communication you notice in your “Notes and Notices” above mentioned, is *not* quite “romancing” in what he says. A derangement *did* happen of the machinery of our

Carriage (the first that ever did happen), on the evening of the day after Christmas-Day last. Our men had the Carriage out for a considerable time, about the New Road and Regent's Park, whereby they got a good many shillings to provide them with a good supper. I was absent from town. Running past an omnibus which was at full gallop, one of our eccentric valve-rods broke (the why and the wherefore I will, for the sake of brevity, omit). The Carriage might, notwithstanding, have proceeded home at ten miles the hour, by the work of only one cylinder, but it was attempted to make the repair on the spot. The Carriage did run by steam to the factory, and took in coke and water, but upon going out again, it was found that the repair had been imperfectly done;—evening was advancing, and the men's pastime was given up. The next morning, Friday, the repair was made in less than an hour, and the Carriage ready to start at the usual time. But it poured torrents of rain—nobody came—consequently nothing to go out for. The next day was finer—I returned to town—some friends came to see us, and we took them (I think it was) to Edgware. Your correspondent "Truth," therefore, was not absolutely "romancing" as you say, although he has exaggerated. But, Mr. Editor, I don't know what you mean, by saying "Colonel Macerone has himself reported to us very regularly what he has been doing since Christmas-Day, and he has never mentioned anything of the kind." I have done no such thing, Sir! I announced in the public papers, and informed you by letter, that although we had been running the Carriage daily for some time past, we should only begin to run regularly for *fare* on the first of the year. What necessity was there for me to publish an account of the incident which occurred six days previously, and which, in fact, both from its trifling nature, and from not having been present myself, had entirely escaped my thoughts, until I was reminded of it by our indefatigable attendant, "Truth."

Adieu, for the present, Mr. Editor. I hope soon to give *You, H., and Co.* an opportunity for the exercise of your bold ingenuity in slipping out of your meaning—swallowing your words—wisking off the "fifty guineas"—and swearing that

Messrs. Dowling, Hodskin, Fraser, and perhaps even another, form not three or four "puffers," "but one individual"—upon which monomorphose condition H. stakes his gold.

I have the honour to be, Sir,

Your obedient humble Servant,

FRANCIS MACERON

London, January 16, 1834.

P.S.—I beg to inform your readers that my rejoinder to your notes, which you stated you could not insert for want of room, has been printed, and may be had gratis, by your readers applying to their newsmen.

The gallant editor still continuing to sneak from the test of exposition, not only did refuse to lay the above before his readers, but actually had the effrontery to leave the letter unopened, for the excellent and satisfactory reasons, given under his own hand and seal, page 272, No. 545, as follows :—

"The letter of M. is left for him unopened at our office, because, subscribed with a condition, that if not inserted it must be returned. We cannot engage to return letters, except in very special cases—among which we do not reckon that of a person who annoys an editor with epistles which he knows cannot be inserted, and then, for the sake of doubling the annoyance, pesters him for their restoration."

Arrived at this point of the unequal controversy—a controversy in which one party say all they please, and the other is refused a hearing!—the poor editor, quite at his wit's end how to injure and insult the man who had never injured or offended him, after having enacted Bobadil, and Ancient Pistol, together with the fat knight of buckram-suit-dexterity; now, after the manner of Iago, that other "honest, honest ancient," attempts to deal me out a sly jerk under the ribs, with all the composure of a trite assassin! In the same page in which he announces, above, that my replies to his falsehoods "cannot be inserted," he indites the following impudent libel :

"Mr. Ogle, when asked, the other day, the reason for his apparent retirement from the field of locomotive competition, replied, that he had lent his

boiler to Colonel Macerone, and that it was with this boiler all the Colonel's recent performances on the Edgware-road were performed. If so, what comes of Colonel Macerone's often reiterated assertion, that his seventeen hundred miles (since magnified to twenty-five hundred) have all been performed with the same machinery, and that machinery of his own and partner's invention? We observe, from the newspapers, that the Colonel has ceased his daily running to Edgware.—How is this? Has Mr. Ogle had his boiler back?"

One of the announcements in the newspapers of my intention of ceasing our daily running, which the simple ingenuous editor cannot understand, but asks "How is this?" is the following. Another will be seen in the editorial report of the Times, at the end.

TO THE EDITOR OF THE TRUE SUN.

Sir,—You would much oblige me by informing the public that to-morrow (Wednesday) will be the last day that Mr. Squire and myself will run our Steam Carriage for the present bout. It takes us and our men too much from our work, and has answered the purpose we had immediately in view. We are, however, ready to run the Carriage, which is in as good order as the day it was finished, any distance on any road in England, at the desire of such as may show a good reason for the requisition, and will defray the expense.

I have the honour to be, Sir,

Your obedient humble Servant,

FRANCIS MACERONE.

Wharf 19, Paddington, Jan. 14, 1834.

Our wise editor cannot, moreover, comprehend how a coach after having run for six months, is likely to have run more miles than when it had only run for three months! Oh, candid, logical editor!

With respect to the libel, I shall not in this place expose the merits, either in respect to falsehood, malignity, or stupidity of this last effusion of baffled petulance. Suffice it to show, that true to his cowardly system of withholding my replies, in lieu of

the one I upon this occasion sent him, the editor, in his subsequent No., 546, gives the following impertinent rigmarole, followed by an exaggerated reiteration of a statement, to the original of which, his readers would have seen my reply (page 18) had he not so meanly denied its insertion.

"We have received a letter from Colonel Macerone, in which he says that the paragraph in our last number, beginning with the words 'Mr. Ogle,' and ending with those, 'his boiler back,' is an impudent and malignant libel, as he will 'soon prove' by certain 'legal proceedings' which he means to take 'against the responsible parties.' We readily give Colonel Macerone the immediate benefit of this contradiction; and take the opportunity of adding, that if *justice* be all he seeks, he can be at no difficulty in determining who the *properly* 'responsible parties' are. We but repeated a story which Mr. Ogle had made current all over London, and which—he it observed—is not disclaimed by Mr. Ogle, though denounced as a libel by Colonel Macerone*.

* What have I to do with the "story which Mr. Ogle makes current all over London," or with any of Mr. Ogle's stories? Suppose Mr. Ogle had been saying that I had stolen his watch, or his coat, would you, Mr. Editor, *print and publish* such a "story" without further inquiry, or authority? I should have thought you too knowing for that, whatever might be the stimulus of your malice! Besides, you ought to know that Mr. Ogle tells a great many wonderful stories—not from any intention to deceive—but from a little bit of that habit, which you, Mr. Editor, falsely attribute to me, "the habit of speaking at random, without due attention to the value of words." For example: I can produce, at least, two highly respectable gentlemen, to whom Mr. Ogle has declared, that on a Rail Road his Steam Coach would go at the rate of two hundred and fifty miles an hour!! One of these gentlemen (at my suggestion) asked him how many strokes of the pistons that would be per minute? "This," Mr. Ogle replied, "*he had not calculated!*" So to give him a lift, like a good brother steamer, I will tell him that his wheel being five feet diameter, each of his pistons must make twelve hundred and fifty *double* strokes a minute! The piston rod must go in and out of the cylinders 2,500 times each minute! If you don't believe this "story," ask Mr. Jacob Perkins and Mr. Alexander Gordon, the engineers, or Mr. Thomas Williams, whom you have often seen with me. By-the-by, engineers say (though I don't believe it), that a *wrought iron* wheel flies to pieces at a velocity of 400 feet per second, only sixteen miles an hour more than Mr. Ogle's Carriage can travel on a Rail Road!! Ha! ha! ha!

“ ‘ Philo-Truth ’ (who has sent us his real name and address) assures us that there was ‘ not the least romancing ’ in the statement sent us by ‘ Truth,’ respecting the misadventures of Messrs. Macerone and Squire’s Carriage, on the 26th and 27th of December, and that he is ‘ ready, as well as many others, to bear testimony to its perfect accuracy.’ We suppose, therefore, that there was *is truth*, no *romancing* in the case; the more especially as Colonel Macerone himself has neither offered to deny the misadventures alluded to, nor to explain how he happened to forget so completely all about them!”—
ED. M. M*.

I now take my leave of Mr. Editor. *We shall meet again at Philippi.*

For the information, however, of those who take an interest in the progress of elementary locomotion, I will, to this exposé, append two “ specimens of broad sheet authority ” for the recent performances of our Carriage, the one written by Mr. Sheridan of the *Times*; the other by Mr. Snow of the *True Sun*. The diminished speed which prevailed on the latter journey, was occasioned by our supply of coke having accidentally fallen short on the road, so as to oblige us to substitute coals obtained at the public-houses; the power of coals compared to good coke, in raising steam, is only as three is to eight.

FRANCIS MACERONE.

London, January 27, 1834.

* “ Truth ” lost a good thing, by not being with us on Saturday the 1st instant. Owing to our having been obliged for many weeks to take our water from the horse troughs on the road-side, some particles of hay, &c. getting under the pump valves, prevented their duly throwing water into the boiler, which becoming hot, caused some rivets to stretch, which caused a leakage, which, extinguishing our fire, caused a delay on the road of more than two hours. Oh! friend “ Truth,” and “ Philo-Truth,” what a thing ye have lost! I fear ye will never meet with any such again!

January 10, 1834.

MACDONALD'S STEAM CARRIAGE.

The Steam Carriage for which Colonel Macdonald has obtained a patent, and which has been exhibited in Oxford-street to Edgware for the last fortnight, and in Uxbridge, and notwithstanding the extremely bad state of the road, owing at once to the long distance, and to the quantity of loose gravel which is at present being laid down upon it, the trial afforded another excellent proof of the success which has attended the efforts of the inventor in bringing to a comparative degree of perfection the construction of locomotive carriages. The road, which, even in the worst weather, is a very bad one, was, as before-mentioned, in the best possible condition, and yet the journey from the Royal Circus, Oxford-street, to Uxbridge, was performed, making stoppages into account, in an hour and a quarter. The consumption of time in the stoppages, for the purpose of taking on water and fuel, was, of course, considerable, but that is a matter that can be easily remedied by the establishment of stations at proper distances, and with suitable apparatus, upon any road in which a carriage of the kind may be started. The first two miles were performed in seven minutes and a half, and the average rate of speed was twelve, fourteen, and sometimes sixteen miles an hour. Indeed, it was manifest that in summer, and upon a good road, the coach could go even twenty miles an hour. Up some of the hills, which had been thickly covered with gravel, it went at the rate of eight miles an hour. On its return to town, one of the Oxford stages in full gallop passed it, while taking in water at Kensington. After the lapse of a few minutes the Steam Carriage followed, came up with the stage, still at full gallop, passed it, and left it "no where" ere it arrived at the commencement of Oxford-street. This carriage, we understand, has already run 2500 miles without being detained on the road for a single minute by any derangement of the machinery, save

breaking of the axle-tree on its return from Windsor in last number,—an accident to which every other species of vehicle is equally liable, and against the recurrence of which, in the case of the Steam Carriage, the patentees state they have fully provided. It is the intention of the patentees, we are, to continue running the carriage for some days longer to elude, when it will be discontinued. They at the same time express their willingness to run the carriage, for the purpose of testing the power of the engine, upon any road in the king-

TRUE SUN, JAN. 13, 1834.

This interesting vehicle performed its second experimental journey to Uxbridge and back again to London on Friday the 10th. It left the corner of Regent-street, Oxford-street, at half-past one o'clock, and arrived at Uxbridge at two, a period of just two hours and a half, and a distance of exactly sixteen miles : making, on average, inclusive of stoppages, of a mile in 9 6-16, or of nine minutes twenty-two seconds, or something better than six miles an hour. It is not to be supposed, however, that this is the actual rate at which it did travel while it was in motion. Several consecutive miles of the journey were, in fact, completed in periods varying from five minutes to $6\frac{1}{4}$ minutes, and in some instances in five minutes ; thus giving the true speed of the machine, while in action, an expression equal to an average rate of eleven to twelve miles an hour, as its capability at particular occasion. It should, however, be borne in mind that the night previous to the day of the journey was unusually wet ; also that during the entire preceding day it rained continuously ; and that, in point of fact, there had not been a complete dry day and night in the foregone week. The consequence of which was, that the road, a radically bad one, especially, was in the worst possible state ; and that, as a matter of course, the vehicle had in its progress to contend with

extraordinary disadvantages. It surmounted them, however, in such a style as proves, if to the thinking portion of the community proof were now requisite, the triumph of that great principle, the perfect power and capability of Steam Carriages to travel on common roads of the most ordinary and even worst descriptions.

As the journeys which the spirited patentees of this vehicle have been hitherto performing are merely experimental, it could not be expected that the same facilities for obtaining the necessary supplies of water and fuel on the road should exist as if it had been regularly plying for hire and the accommodation of the public. Hence the lost time on the way, and, consequently, the apparent slowness of the progress. The first watering was effected at a pump at Norland-house, beyond the Bayswater turnpike. No preparations had been made for it, and a considerable portion of time was, consequently, consumed in the operation. It occupied exactly fifteen minutes, a period during which, at its ordinary pace, the vehicle could have easily gone over three miles of ground. The second watering being made at a roadside inn, where some descriptions of convenience were at hand, occupied but half the above time, seven and a half minutes, a period which, however, might be abridged at least two-thirds, if necessary arrangements had been made, and engines adapted for the purpose previously constructed on the several points of rest on the road. But this our readers will easily perceive was, under existing circumstances, quite impossible. Indeed, the proprietors must have been at such an enormous expense already as will readily afford to a fair-thinking public sufficient excuse on that subject. The third and last watering—the worst and most inoperative of all—occupied twenty minutes. Thus making, in all, a period of forty-two minutes and a half, thirty of which might, under other circumstances, have been saved, and so six miles of ground gone over. The carriage then dashed on to Uxbridge in very fine style, and stopped at the entrance of the town at two o'clock precisely. It stayed in Uxbridge only a very few minutes—sufficiently long to obtain another supply of water, and then left it on its return to London.

We do not pretend to give a scientific description of the

machinery of the vehicle, the more especially as it would be uninteresting to the generality of readers. The body of the carriage, that of a large barouche, capable of containing nine persons, is in front of the fire and boiler, which are enclosed in a sheet iron case, attached to its back. The cylinders, two in number, are horizontal, and occupy each side of the perch, under the vehicle. The water is contained in a reservoir attached to the base of the body of the carriage, and is supplied from a duct in front of the steersman's seat. The steersman, one engineer, and a passenger, occupy the front seat of the carriage; and a stoker, or fireman, remains behind, to attend to the necessary operations of his peculiar department. The passengers, as we have already said, sit within the barouche body of the vehicle. It might be supposed that the generation of steam, and the many other operations necessary to the locomotion of the machine, might produce a disagreeable sensation to those within it; the contrary, however, is the case. In no respect, that of smell, or any other, has it such an effect. The speed with which it travels, while in action, is perhaps the principal cause of the pleasantness of its motion to the passengers: but whatever the cause may be, it is certainly far pleasanter to travel by than any horse coach, however well appointed it may happen to be. It turns with the greatest facility too: and even the most acute angles in a narrow street present no impediment to its speed or certainty. This arises from the peculiar construction of the wheel and axle. But, decidedly, the greatest marvel of all is, its complete subjection to the touch of the steersman. It threads the most crowded thoroughfares with an ease, a completeness, and a degree of safety, impossible of attainment or execution by a vehicle drawn by quadrupeds; it passes through the space allotted to it by accident, or design, in such a situation with the accuracy and noiselessness of a well-fitted instrument in a lubricated groove; and, more wonderful still, it stops at a second's notice; stops as immovably as if it had been fixed there from the beginning of time itself. It thus obviates the possibility of accident to life or property; and fully

of the eloquent and accomplished writer in

the *True Sun Daily Review*, substantially that the recurrence of accident on ordinary roads would always prevent the use of Steam Coaches on them to any considerable extent; and, consequently, that Railways would, as a matter of course, ultimately supersede these engines. Though we are far from saying that this machine is perfect in all the *minutiæ* of which long experience and severe trial are alone the foundation, we have no hesitation whatever in saying that the principle is sufficiently wrought out to prove its full perfectibility. And, moreover, we would add, that it is the most perfect, even in its present condition, which has as yet come under our notice.

The following graphical account of a Steam trip to Watford, by Mr. Leitch Ritchie, appears in *Turner's Annual Tour* for this year, 1834.

“ Drawn one day out of a hut on Bushy heath, by the appearance of an unusual commotion among the inhabitants of the village, we saw a Steam Coach which had stopped at the door of the public house. The apparition of a vehicle of this kind, in such a place was unaccountable. A balloon would not have surprised us; but the idea of steam was associated in our minds only with that of rails, flat ground, or the level ocean. Bushy Heath forms the plateau of a mountain, which is the highest point of *terra firma* in Middlesex; and although so far inland, serves as a landmark for vessels at sea. The access to it from the London side, is by a road far steeper and more difficult than the one by which we once climbed over the Simplon into Italy.

While meditating on a phenomenon which left our philosophy at fault, we were accosted by Colonel Macerone, in whom we were glad to recognise an old acquaintance: and, in reply to our questions, he informed us, that although the roads were in a peculiarly bad state, the journey had been performed with perfect ease—adding, that it was his intention to proceed to Watford. Now if the road from Edgware to Bushy Heath was steep and

difficult, the descent from Bushy Heath to Watford was much worse. A portion of it, more especially, called Clay Hill, we knew to be absolutely precipitous, and not only so, but of a soft and treacherous nature, answering to its name. When ascending this hill to the Heath, it is requisite even for the light stage coaches, drawn by four horses, to employ the service of a fifth horse, in order to surmount the difficulty. We told our friend that he might *go* by Steam to Watford, but that we were quite certain he would not return by the same means of locomotion. Nevertheless, at his pressing instances, we consented to hazard our own person in the adventure.

"We set off, amidst the cheers of the villagers, at a pace about equal to the gallop of a stage coach. The motion was so steady, that we could have read or taken notes with the greatest ease; and the noise, so disagreeable to passers by, was not at all so great to us as that of a common vehicle*.

On arriving at the somewhat sudden commencement of the descent of Clay Hill, the local inexperience of the attendant (who had never been on this road before) led him to be guilty of a neglect which might have been followed by troublesome consequences. He did not descend to perform the operation, which, in another kind of coach, is called "clogging the wheel," till it became impossible. The impetus already acquired by a vehicle of such enormous weight, was irresistible† 'and we went thundering down the steep, at a rate, it was supposed, of not less than thirty miles an hour‡.'

Fortunately, there was nothing in the way; but even if there had been other carriages on the road, we are not prepared to say

* This is a curious instance of even a man of genius taking things for granted. Mr. Leitch Ritchie had heard that certain Steam Carriages made a disagreeable noise; so, contrary to the evidence of his senses, he assumes that our's must, although he could not hear it.—F. M.

† No such "enormous weight" neither; it is only two tons and a quarter.—F. M.

‡ See Mr. Ogle's evidence *on his rate of travelling with his Steam Carriage*, given before the Select Committee of the House of Commons, &c.—F. M.

that any accident would have occurred. Our impression, indeed, is quite on the other side. Mr. Squire, who acted as steersman, never lost his presence of mind for an instant; and the huge vehicle—speed only excepted—appeared to be as docile in his hands as a lady's pony. It may be conceived what amazement a thing of this kind, flashing through the village of Bushy, occasioned among the inhabitants. The people seemed petrified. The front of the carriage, without horses, or other apparent means of locomotion—the line of black smoke streaming like a flag behind us*, and the calm faces of the Colonel and his partner in front, as each continued quietly to smoke his cigar, were alike unaccountable.

In the busy and populous town of Watford, the sensation was similar. The men gazed in a grave and speechless wonder; the women, less reflective, but more generous, clapped their hands, and screamed for their brothers and husbands to come and see. We at length "put about," at the farther end of the line of street, in magnificent style; and, as we commenced our return, were greeted with one long shout from the whole population.

Our evil augury, we are happy to say, was not verified. We ascended Clay Hill at the same rate which is performed every day by the stage coaches with five horses; and if the road had been hard, or even covered in the soft places with broken granite, our speed would have been far greater. There was indeed a momentary stop; but this was caused by one of the wheels not being firmly enough fixed to the body of the vehicle†. We at length regained our starting-place, in the firm persuasion that we had witnessed the commencement of a revolution which will one day change the whole face of Europe, and produce results, moral, social, and political, so gigantic as to be beyond the grasp even of the imagination.

* This about the "black smoke" must be a mistake. There may have been some waste steam rendered visible by the cold damp evening air.—F. M.

† There being only one wheel "clutched" to the axle, it slipped for about seconds on a particularly steep and soft part of the hill. In going up very steep and soft places, both wheels should always be "clutched."

The expense of running these carriages, as Colonel Macerone informed us, compared with that of the four-horse stages, is as one penny is to a shilling*.

If this is a digression, it cannot be considered a very irrelevant one in the narrative of a traveller. If our book, however, shall last a century (and unless the plates are detached, we think it will), the above account of our "expedition" will be read with a smile. At that time, Steam Coaches will traverse the civilized countries of Europe from end to end—Steam Ships will circumnavigate the globe—AND THE DESCENDANT OF SIR CHARLES DANCE WILL COME INTO TOWN FROM HIS SEAT AT BUSHY IN A STEAM GIG†.

* That is to say, as regards the propelling and tractile powers, coke *versus* four horses.—F. M.

† "The descendant of Sir Charles Dance!" What the deuce has the writer to do with "Sir Charles?" Why just been riding in his Steam Carriage, to be sure? who would not think so? Not a bit of it—he had never even seen it, or any other common road Steam Carriage in his life before! But he *had just heard* of it, for the people at Bushy, where we dined, had been talking to us about "Sir Charles" having been there with his Steam Carriage some time previous, while the roads were dry and hard, and free from new gravel, and having had horses to drag his "drag" up those very hills which, in spite of mud, clay, and new gravel, the author had so triumphantly ascended by dint of steam alone! The French will not comprehend his matter, but thank God, in England it will be understood that it is the "seat"—the seat—which very properly carries off the author's steam-gig prize. Alas! for a "seat!"—not in "the bad house," but on some hill, or bushy place! I'll get me one, of some kind or other—somewhere or other—that I may have a "descendant" a hundred years hence, and a steam-gig!—F. M.

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